

RISC System/6000

System Overview

Hardware
Software
Communications
Documentation & Training



For the Power Seeker • Connectivity • POWER Architecture • 3-D Graphics • World-Class Support

IBM

Seventh Edition (October 1993)

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Communications Statements

The following statement applies to this product. The statement for other products intended for use with this product appears in their accompanying manuals.

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Neither the provider or the manufacturer are responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

United Kingdom Telecommunications Safety Requirements

This equipment is manufactured to the International Safety Standard EN60950 and as such is approved in the UK under the General Approval Number NS/G/1234/J/100003 for indirect connection to the public telecommunication network.

The network adapter interfaces housed within this equipment are approved separately, each one having its own independent approval number. These interface adapters, supplied by the manufacturer, do not use or contain excessive voltages. An excessive voltage is one which exceeds 70.7 V peak ac or 120 V dc. They interface with this equipment using Safe Extra Low Voltages only. In order to maintain the separate (independent) approval of the manufacturer's adapters, it is essential that other optional cards, not supplied by the manufacturer, do not use main voltages or any other excessive voltages. Seek advice from a competent engineer before installing other adapters not supplied by the manufacturer.

International Electrotechnical Commission (IEC) Statement

This product has been designed and built to comply with IEC Standard 950.

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The following is a summary of the VCCI Japanese statement in the box above.

This equipment is in the Class 1 category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council For Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in commercial and/or industrial areas.

Consequently, when used in a residential area or in an adjacent area thereto, radio interference may be caused to radios and TV receivers, etc.

Read the instructions for correct handling. VCCI-1.

Avis de conformité aux normes du ministère des Communications du Canada

Cet équipement ne dépasse pas les limites de Classe A d'émission de bruits radioélectriques pour les appareils numériques, telles que prescrites par le Règlement sur le brouillage radioélectrique établi par le ministère des Communications du Canada.

L'exploitation faite en milieu résidentiel peut entraîner le brouillage des réceptions radio et télé, ce qui obligerait le propriétaire ou l'opérateur à prendre les dispositions nécessaires pour en éliminer les causes.

Canadian Department of Communications Compliance Statement

This equipment does not exceed Class A limits for radio noise emissions for digital apparatus, set out in Radio Interference Regulation of the Canadian Department of Communications. Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the owner or operator to take whatever steps necessary to correct the interference.

Radio Protection for Germany

Instructions to User: Properly shielded and grounded cables and connectors must be used for connection to peripherals in order to meet German emission limits. Proper cables are available from authorized dealers.

Order Information: For new orders, contact an authorized sales representative. For replacement orders, contact an authorized service representative.

The following statement applies to this IBM product. The statement for other IBM products intended for use with this product appears in their accompanying manuals.

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Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from authorized dealers. Neither the provider or the manufacturer are responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

United Kingdom Telecommunications Safety Requirements

This equipment is manufactured to the International Safety Standard EN60950 and as such is approved in the UK under the General Approval Number NS/G/1234/J/100003 for indirect connection to the public telecommunication network.

The network adapter interfaces housed within this equipment are approved separately, each one having its own independent approval number. These interface adapters, supplied by the manufacturer, do not use or contain excessive voltages. An excessive voltage is one which exceeds 70.7 V peak ac or 120 V dc. They interface with this equipment using Safe Extra Low Voltages only. In order to maintain the separate (independent) approval of the manufacturer's adapters, it is essential that other optional cards, not supplied by the manufacturer, do not use main voltages or any other excessive voltages. Seek advice from a competent engineer before installing other adapters not supplied by the manufacturer.

International Electrotechnical Commission (IEC) Statement

This product has been designed and built to comply with IEC Standard 950.

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VCCI Statement

The following is a summary of the VCCI Japanese statement in the box above.

This equipment is in the Class 2 category (information equipment to be used in a residential area or an adjacent area thereto) and conforms to the standards set by the Voluntary Control Council For Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in such residential area.

When used near a radio or TV receiver, it may become the cause of radio interference.

Read the instructions for correct handling. VCCI-2.

Avis de conformité aux normes du ministère des Communications du Canada

Cet équipement ne dépasse pas les limites de Classe B d'émission de bruits radioélectriques pour les appareils numériques, telles que prescrites par le Règlement sur le brouillage radioélectrique établi par le ministère des Communications du Canada.

Canadian Department of Communications Compliance Statement

This equipment does not exceed Class B limits for radio noise emissions for digital apparatus, set out in Radio Interference Regulation of the Canadian Department of Communications.

Radio Protection for Germany

Instructions to User: Properly shielded and grounded cables and connectors must be used for connection to peripherals in order to meet German emission limits. Proper cables are available from authorized dealers.

Order Information: For new orders, contact an authorized sales representative. For replacement orders, contact an authorized service representative.

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About This Book

This book provides information on RISC System/6000 hardware, software, communications connectivity, and documentation offerings. The *RISC System/6000 System Overview*, along with its companion book, *RISC System/6000 Planning for Your System Installation*, describes preliminary, high-level planning information for technical personnel evaluating the RISC System/6000 system.

This book is intended for those considering the purchase of a RISC System/6000 system.

Overview of Contents

This book contains the following chapters:

- Chapter 1, "Hardware Offerings," describes the system units and peripherals, including cabling and electrical considerations.
- Chapter 2, "Software Overview," contains an overview of RISC System/6000 software. It is not intended to be a comprehensive list of all software.
- Chapter 3, "Communications Connectivity Overview," describes methods of connecting the system unit to various systems and devices.
- Chapter 4, "Documentation Overview," provides a brief overview of the documentation for the RISC System/6000 product offerings.
- An index is provided at the back of this book.

Related Publications

The following is a list of related publications.

- *IBM RISC System/6000 Planning for Your System Installation*, GC23-2407, discusses planning issues related to the hardware, software, and communications features described in the *IBM RISC System/6000 System Overview*.
- *IBM AIX Catalog*, GC67-0210, gives detailed information about software offerings.
- *International Catalog of Micro Channel Adapter Cards*, G360-2824, lists expansion adapters commercially marketed for IBM systems.
- *IBM RISC System/6000 Technology*, SA23-2619, provides detailed discussion of the architecture of RISC System/6000 system units.
- *IBM FDDI Adapter User's Guide and Programming Reference*, SC23-2426, discusses planning, installing, and operating the IBM FDDI adapter.
- *FDDI Introduction and Planning Guide*, GA27-3892, provides information on installing FDDI systems.
- *FDDI Optical Fiber Planning and Installation Guide*, SC27-3943, provides information about FDDI optical systems.

Ordering Publications

You can order IBM publications from your IBM sales representative or, in the U.S., from IBM Customer Publications Support at 1 800 879-2755. If you believe you are entitled to publications that were not shipped with your RISC System/6000 or AIX purchases, contact your IBM sales representative or Customer Publications Support for assistance.

To order additional copies of this book, use Order Number GC23-2406.

Chapter 1. Hardware Offerings

RISC System/6000 System Structure Overview

The IBM RISC System/6000 system units are a second generation of computers using the *Reduced Instruction Set Computer (RISC)* architecture. They offer a full range of multiuser, multitasking, open-architecture workstations and servers. The RISC System/6000 system units are designed to be used in a wide variety of computing environments, including numeric-intensive scientific applications, graphics-intensive engineering applications, and input/output-intensive commercial applications.

This section provides an overview of the architectures used for the RISC System/6000 system units. The POWER/POWER2 architecture is described below, for information on the PowerPC architecture which is implemented in the 7011 Model 250, see page 1-7.

POWER/POWER2 Architectures

Most RISC System/6000 system unit is built on IBM POWER/POWER2 (Performance Optimization with Enhanced RISC) architecture and is implemented in CMOS VLSI technology. This is a multiple chip or module design. The system supports the IBM Personal System/2 Micro Channel architecture and takes advantage of:

- Advanced memory technology
- Advanced printed circuit board technology
- Surface mount technology
- Multichip module technology.

Many design innovations enable the RISC System/6000 system units to function superbly in a wide range of application environments. These innovations include the RISC System/6000 RISC processor, which can perform multiple operations in one clock cycle; the RISC System/6000 virtual memory architecture, which provides extensive addressing capabilities for large databases; and the RISC System/6000 I/O subsystem, which is built around Micro Channel architecture. Reliability, availability, and serviceability are the main considerations in the design of the RISC System/6000 system. Extensive uses of memory error-checking and correction (ECC) code are found throughout the system.

Notes:

1. While Models M20, M20A, 220, and 230 do not implement all of the features described in this section, they do maintain complete POWER architecture compatibility. These models use a single chip implementation of the POWER architecture.
2. Systems that implement the POWER2 architecture, such as Models 58H, 590, and 990 can use additional instructions.

RISC Processor

The RISC System/6000 RISC processor employs several POWER architectural and implementation features that set it apart from earlier RISC processors and enable it to perform multiple operations in one clock cycle. Separate fixed-point and floating-point units run simultaneously, while separate instruction and data caches work with the branch processor to perform zero-cycle branch operations. The POWER2 architecture implements

dual fixed and floating point units with dual ported 128/256K-byte data cache, 32K-byte instruction cache, a 128/256 bit memory interface, and a higher performance branch processor. The interfaces between chips have been widened compared to the POWER architecture implementation to feed the dual execution units. The POWER2 architecture implements software-accessible performance monitors. The RISC System/6000 instruction set exploits the concurrent performance capabilities of the processor by providing powerful instructions, including string operations and a floating-point multiply-and-add operation ($A \times B + C$). With these and other architectural features, the POWER2 implementation of the RISC System/6000 processor can execute six instructions in a single clock cycle: a branch instruction, two fixed-point instructions, two floating-point instructions and a Condition register logical instruction. In the POWER implementation, four instructions can be run: a branch instruction, a fixed-point instruction, a floating-point instruction and a Condition register logical instruction.

The RISC System/6000 processor supports precise interrupts. When an instruction causes an interrupt, the pipeline stops before the subsequent instruction can affect the machine state. Consequently, a return from an interrupt can resume at the interrupting instruction.

A built-in self-test is performed at startup. It tests the processor complex by generating test patterns that are used by the POWER processor VLSI chips to verify correct chip operation. All processor chips have data parity in their data paths; internal arrays and processor chip-to-chip data buses have parity.

Virtual Memory

The RISC System/6000 virtual-memory architecture provides 4-petabyte (2^{52}) virtual address space and 4-gigabyte real address space made up of 4-kilobyte pages. This extensive virtual addressing capability provides the potential for a large number of concurrently open files and active objects.

The memory subsystem is tested during startup. It is designed to implement ECC with detection of double-bit errors and detection and correction of single-bit errors. Bit steering is provided to automatically substitute a spare bit of memory for a detected faulty data bit or ECC bit. Bit scattering is designed to ensure that a minimum number of bits of a single word are kept in a given dynamic random access memory (DRAM); this makes it easier for ECC to detect and correct errors in a bad DRAM. Memory control also provides hardware-assisted memory scrubbing, which is a memory test designed to detect and correct single-bit memory errors.

I/O Subsystem

The I/O subsystem maintains a balance between the RISC System/6000 processor and I/O devices by utilizing Micro Channel architecture with the Streaming Data Procedure. The procedure can increase the I/O bandwidth to up to 40 megabytes (MB) per second for models that do not utilize the XIO module, or up to 80 megabytes per second for models with the XIO module. In addition, some models that utilize the XIO module provide two Micro Channel buses, each of which can support data transfers of up to 80 megabytes per second. An independent, high-bandwidth path for the I/O bus enables high-performance disks, graphics adapters, and communications adapters to connect to the I/O bus without limiting processor performance.

The data integrity of the I/O subsystem is enhanced by the support of parity and synchronous channel check on the Micro Channel bus. In addition, multiple distributed I/O processors in adapters are designed to provide higher system performance.

The RISC System/6000 I/O subsystem supports programmable option select (POS). This part of the IBM Micro Channel architecture features software configuration of the Micro Channel resources and adapter identification.

The subsystem also supports vital product data (VPD), which allows the AIX for RISC System/6000 operating system to obtain detailed information from certain hardware, software, and licensed internal code elements of a system at the field replaceable unit (FRU) level. VPD helps the operating system automatically configure the system and assists the user with inventory control. It also assists in areas such as software licensing and product maintenance.

Serial Optical Channel

Certain RISC System/6000 systems have the capability to use Serial Optical Channels when used with the optional IBM Serial Optical Channel Converter. The Serial Optical Channels provide a high-speed fiber-optic port for communications between RISC System/6000 systems and between a RISC System/6000 system and a Network Systems Corporation router.

IBM Semiconductor Technology

Since the first RISC System/6000 processor chip set, IBM has been improving semiconductor chip technology; for example, there is increasingly better line resolution which enables more lines per millimeter for wiring the devices and transistors cells on a silicon chip, and transistors and devices smaller. These advances allow computer designers to design chips with more function and speed (i.e. higher clock frequencies). This has resulted in the design of a complete RISC System/6000 processor on a single chip (RSC), and a new Instruction Cache Unit (ICU).

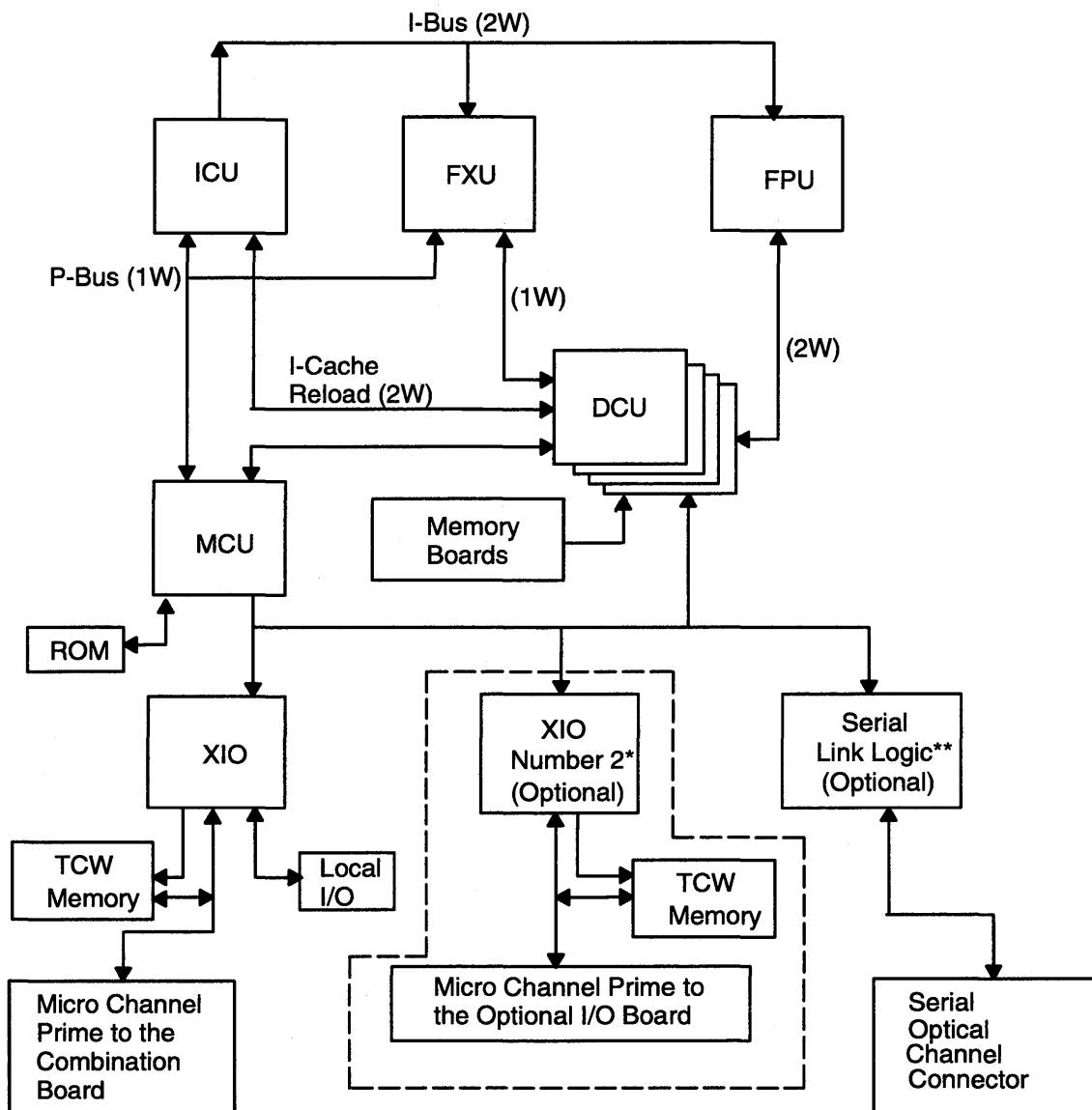
The ICU is one of the chips in the multichip processor set (see the illustration on page 1-4) for the RISC System/6000. The new ICU design has four times the cache size (8KB to 32KB). The larger instruction cache reduces the cache miss rate in many applications, thereby improving performance for these applications. Instructions that are in the cache can be retrieved in a single cycle. When the next instruction required by the processor is not in the cache, it may take tens of cycles to retrieve the instruction.

IBM Module Technology

The latest module technology improvement used in RISC System/6000 systems such as the Model 58H, 590, 990, is the multichip module. Packaging multiple chips on a single substrate provides excellent electrical characteristics for the wide interfaces between chips. The block diagram on page 1-6 shows the multichip implementation packaged in a multichip module. The multichip module contains eight chips: the ICU, FXU, FPU, four DCRs and the SCU.

Conclusion

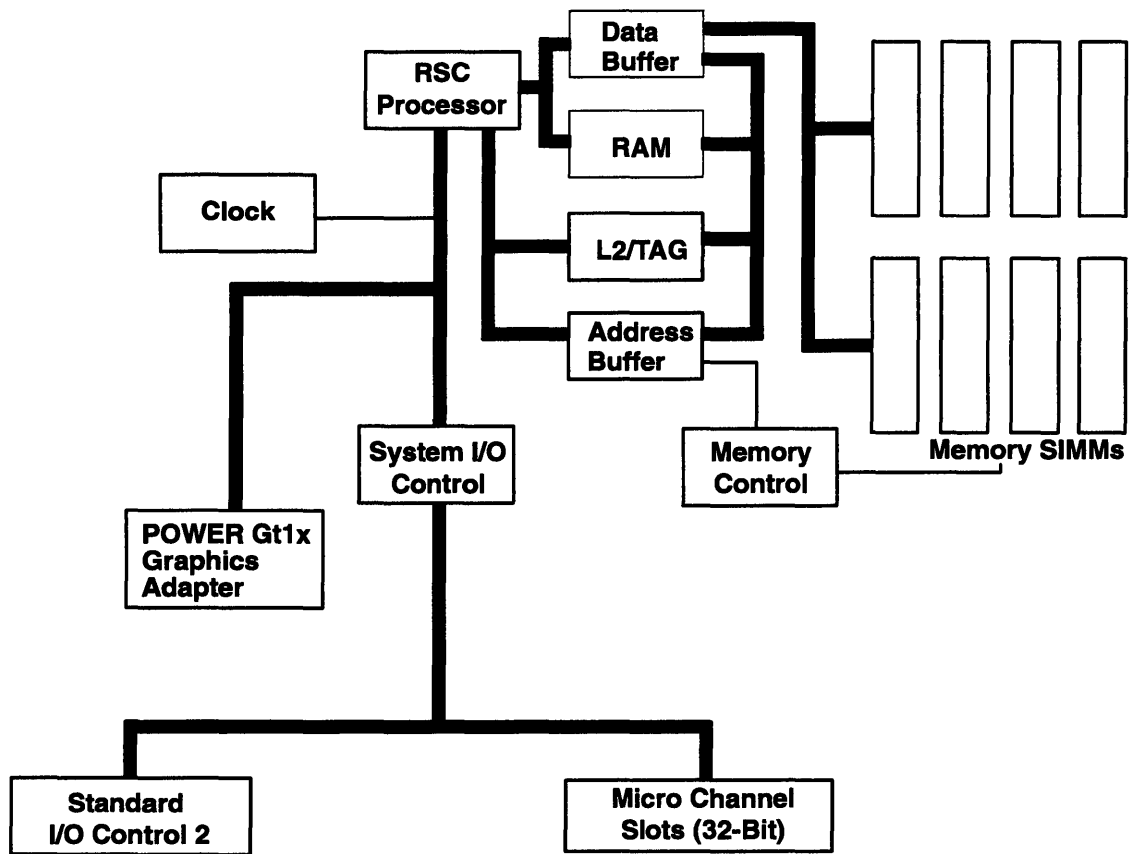
These features of the processor, the virtual-memory architecture, and the I/O subsystem represent just a glimpse of the overall innovation that makes the POWER/POWER2 architecture and technology of RISC System/6000 system units so attractive to a wide variety of application environments. For a detailed discussion of the architecture of RISC System/6000 system units, refer to *RISC System/6000 Technology*, SA23-2619.



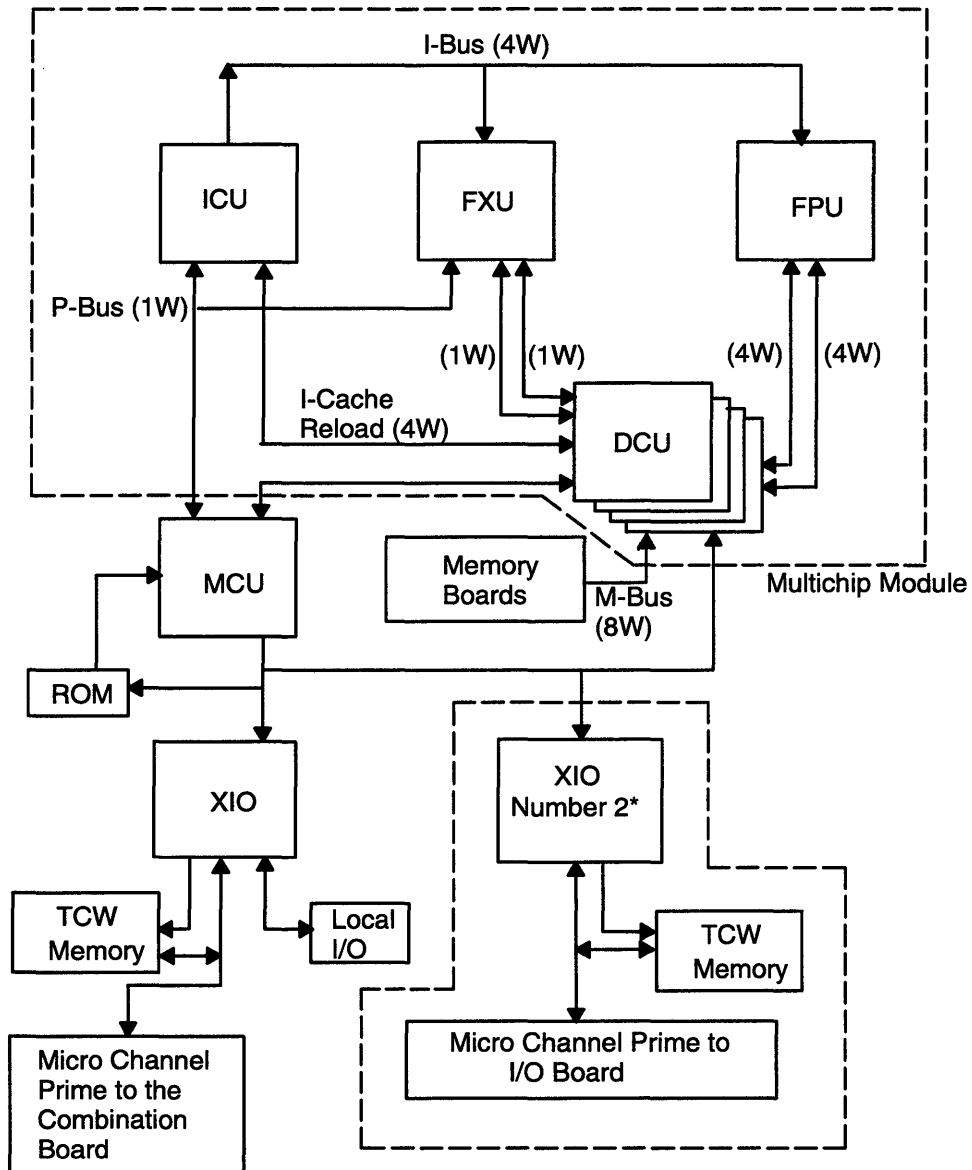
* Optionally available on 7015 Models 970B and 980B. Not available on Model 580

** Optional on some models.

The RISC System/6000 Central Electronics Complex for Models with XIO such as 580, 970B and 980B.



Block diagram showing a RISC single chip (RSC) processor module with supporting memory and I/O modules.



* Available on the 7015 Model 990, not available on 58H or 590.

The RISC System/6000 POWER2 Central Electronics Complex for Models with XIO such as 58H, 590, and 990.

PowerPC Architecture

The PowerPC architecture is a derivative of the multichip POWER architecture which has been developed specifically for single-chip processor designs. The changes incorporated into the PowerPC architecture from POWER architectures are:

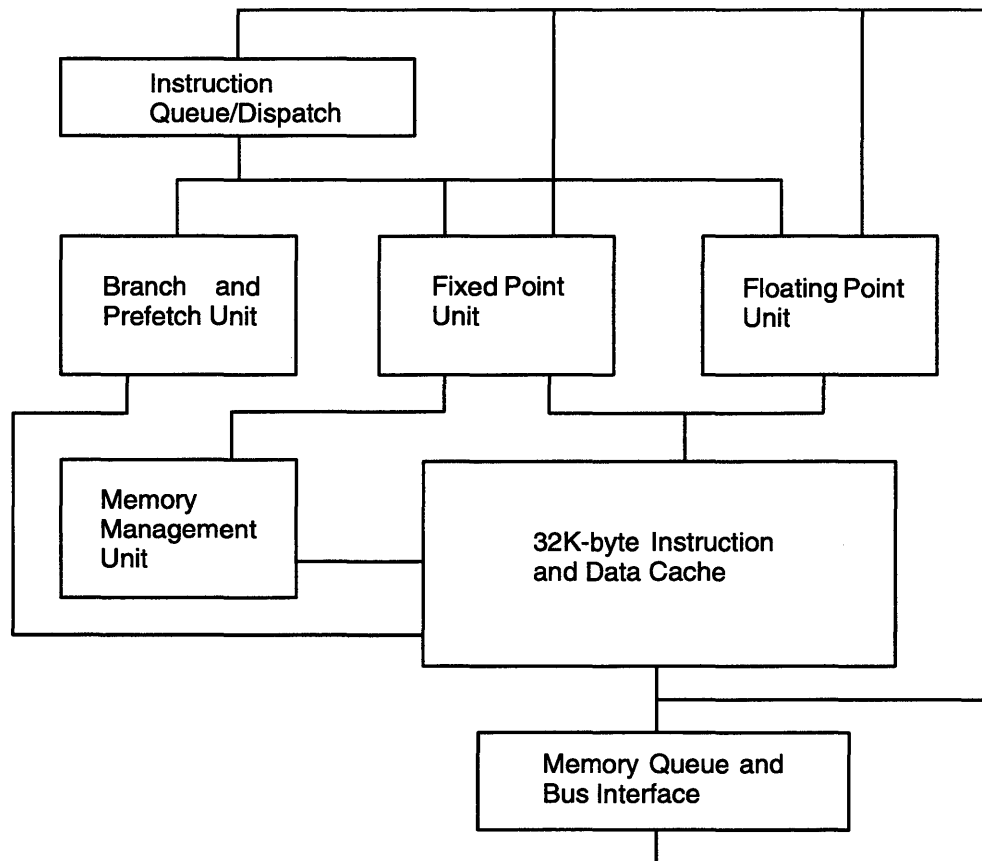
- Simplified Instruction Set
- Single precision floating point
- Modified storage model
- Multi-processor support
- Simplified I/O architecture

The PowerPC architecture is binary compatible with applications written for POWER architecture. Any unimplemented, infrequently used POWER instructions are trapped and emulated.

PowerPC 601 Processor

The PowerPC 601 Processor is the first implementation of the PowerPC architecture. The processor uses IBM's 0.8 μ technology, and is packaged in a 304-pin, ceramic quad flat-pack module. Highlights of the 601 Processor design include:

- Superscalar design allowing up to 3 instructions to execute in a single clock cycle
- Independent branch, fixed-point and floating-point execution units
- 32K-byte, 8-way set associative on-chip cache
- 8-byte, synchronous memory and I/O bus.



The PowerPC 601 Processor Structure.

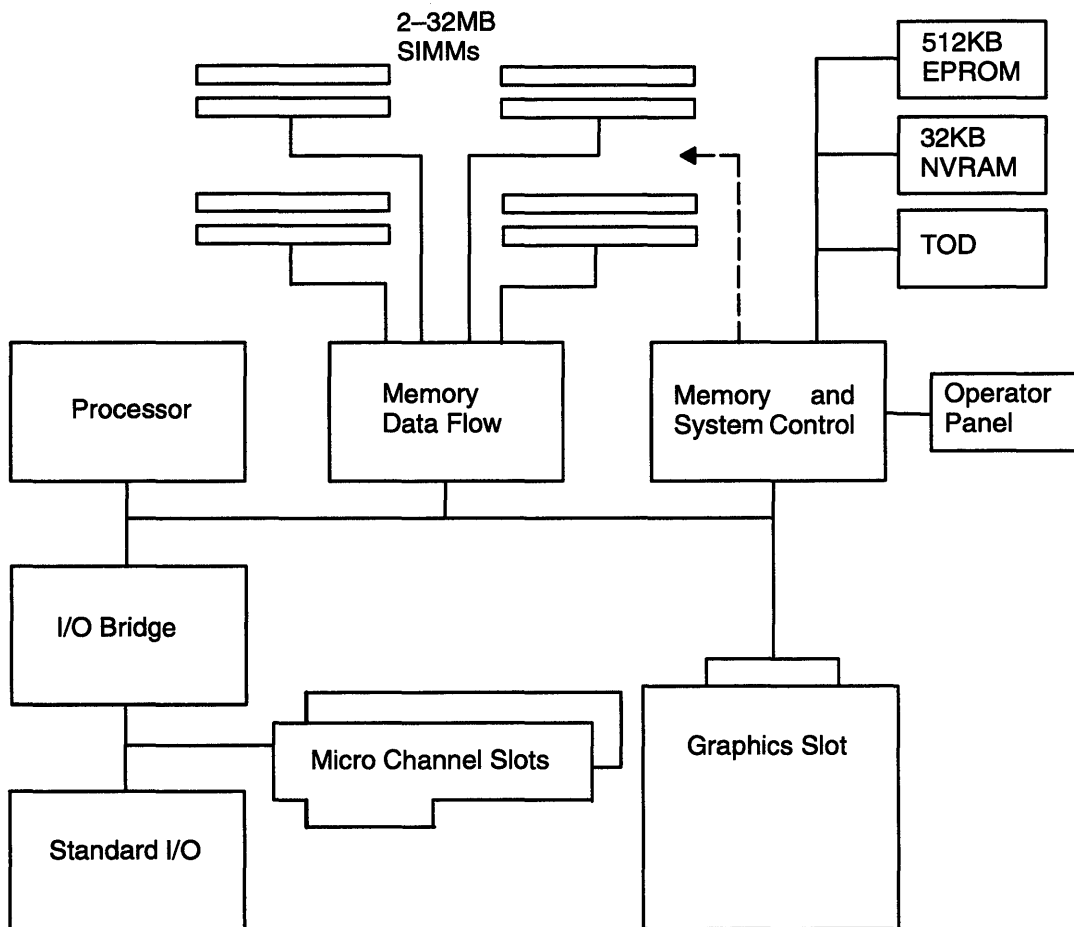
PowerPC System Structure

Many different system designs are possible with the PowerPC processor. The RISC System/6000 Model 250 is designed to achieve good cost/performance from the PowerPC 601 processor chip while maintaining RISC System/6000 family compatibility. A central feature of this design is the extension of the processor interface into a multimaster system bus, used to attach the memory, graphics and I/O subsystems.

The memory subsystem of the Model 250 is organized as two interleaved banks, each eight bytes wide. Personal Computer industry standard DRAM single in-line memory modules (SIMMs) are utilized to minimize memory costs. Error checking and correction (ECC) is done on 8-byte boundaries, eliminating the extra DRAM cost typically associated with ECC systems.

2D graphics adapters are attached directly to the system bus, providing low latencies and high bandwidth to both the processor and memory. This design, along with moving graphics architecturally from I/O space to system-memory space, result in excellent performance from a low-cost graphics engine.

The robust RISC System/6000 I/O model, based on the Micro Channel I/O Bus architecture, is retained. Performance is improved over previous entry systems by using an I/O bridge based on the XIO design used in higher performance RISC System/6000 models.



Structure for systems using the PowerPC architecture, such as the 7011 Model 250.

RISC System/6000 System Units

This information reflects current RISC System/6000 offerings for system units, devices, and options, and is intended for those considering the purchase of a RISC System/6000 system.

The standard system configuration may change in the future. Because of these changes, the configuration of your machine may differ from the configurations mentioned in this publication.

Product Line Overview

The IBM RISC System/6000 family of POWER products spans a range from a single-user Desktop IBM POWERstation M20 through the IBM Scalable POWERparallel Systems (8 to 64 nodes or processors) super computer. Within this range is a family of POWERstations and POWERservers designed to provide a wide range of processing power. In addition to this wide range of processing power, these systems come with several standard I/O interfaces plus expansion slots for memory and I/O adapters. A wide variety of optional features, including communications, graphics, and storage products are available to provide highly configurable and robust systems. This enables customers to configure a system to meet their needs.

The IBM RISC System/6000 POWERstations provide a wide range of processing power to satisfy engineering, scientific, and other technical and commercial graphics applications that require a locally attached graphics adapter with display.

POWERservers can be configured either as LAN-attached servers for multiple users (for example, compute or file servers) or as multiuser systems using ASCII terminals and X terminals such as the IBM Xstations, or Models M20, 220s and 230s. The POWERservers are configured for those applications that do not require a locally attached graphics adapter.

Throughout this document POWERstations and POWERservers are often referred to by machine type or model number.

All of the RISC System/6000 models come in a general purpose configuration. These configurations are identified as POWERstation or POWERserver for example, Machine Type 7012 Model 370. There are several RISC System/6000 models that are preconfigured to be a POWERstation or a POWERserver. Two examples of POWERstations are the 36T and 37T. These systems are powerful technical workstation offerings, used for interactive 3D applications. They come with a POWERdisplay 17, 3D Graphics adapter, 400MB disk drive, 32MB memory, keyboard, and mouse. An example of a POWERserver is the 550L entry-level desktide server. It is configured with 32MB memory, two 1GB disk drives, 1.44MB diskette drive, and a CD-ROM drive. The three systems mentioned come with integrated Ethernet and integrated SCSI-1 Single Ended controller. The preconfigured RISC System/6000 systems emphasize price, performance, and function. In some cases, customers are able to select optional products at an additional charge in place of the standard product included in the package.

RISC System/6000 Systems

The following table shows the RISC System/6000 systems by machine type and model number, indicating the type of system as a POWERstation, a POWERserver, or a POWERstation/POWERserver. Each system is described in more detail in "Comparison of RISC System/6000 Systems" on page 1-16.

Machine Type	Model Number	POWER-station	POWER-server	POWER-station/server	System Orientation
7008	M20/M2A	X			Desktop
7011	220			X	Desktop/Deskside
	22W	X			Desktop/Deskside
	230			X	Desktop/Deskside
	23T	X			Desktop/Deskside
	23W	X			Desktop/Deskside
	23S		X		Desktop/Deskside
	250			X	Desktop/Deskside
	25T	X			Desktop/Deskside
	25W	X			Desktop/Deskside
	25S		X		Desktop/Deskside
7012	34H			X	Desktop/Deskside
	355	X			Desktop/Deskside
	360			X	Desktop/Deskside
	36T	X			Desktop/Deskside
	365	X			Desktop/Deskside
	370			X	Desktop/Deskside
	37T	X			Desktop/Deskside
	375	X			Desktop/Deskside
7013	52H			X	Deskside
	550L		X		Deskside
	570			X	Deskside
	580			X	Deskside
	58H			X	Deskside
	590			X	Deskside
7015	970B		X		Rack
	980B		X		Rack
	990		X		Rack

RISC System/6000 Model Conversion

The following table shows the upgrades on Model conversions that are available for the RISC System/6000 system. The upgrades that are offered vary over time.

Starting System	To System	Converted System
220	230	23E
220, 230	250	25E
34H	370	370
355	365	365
360	370	370
365	375	375
52H	570	57F
550L	570	57F
570	580	58F
570	58H	58H
570	590	590
580	590	590
58H	590	590
930, 950, 950E	970B	97F
930, 95E, 970B, 97F	980B	98F
970, 970E	980	98E
930, 950, 95E, 97F, 98F	990	99F
970B, 980B	990	990
970, 97E, 980, 98E	990	99E

RISC System/6000 Features

The following elements and options are featured on the RISC System/6000 system:

Processors: Processors ranging from 25 MHz to 71.5 MHz are used in the RISC System/6000 product line. These processors contain an integrated floating-point unit that, with software assistance, supports single- and double-precision floating-point operations in accordance with ANSI/IEEE 754-1985 IEEE Standard for Binary Floating-Point Arithmetic.

System memory: Standard system memory ranges from 16MB to 128MB. Maximum system memory ranges from 64MB to 2048MB.

Internal disk drive storage: Standard internal disk drive capacity ranges from 200MB to 4GB, except the Models M20 and M2A which have no internal disk drive capacity.

Diskette storage: A 1.44MB 3.5-inch internal diskette drive is standard on all system units, except the Models 220, 230, and 250 which feature an optional 2.88 MB 3.5-inch diskette drive. The Models M20 and M2A have no internal provision for diskette storage.

External removable disk drive storage: On all system units portable disk drives can each provide either 355MB, 670MB or 1GB of formatted disk drive storage, which is removable from the system.

External disk drive storage: Through the use of expansion units or expansion racks, all RISC System/6000 systems can increase their system disk storage. See "Comparison of RISC System/6000 Systems" on page 1-16 for details.

The POWER Network Dataserver machine type 7051 Models 800 and 840 are high-performance Network Filesystem (NFS) file servers. They range from 10GB to 144GB.

Internal/External storage: The use of internally or externally attached storage devices such as tape drives or optical disks allows storing and backing up, restoring, and archiving of programs.

External Storage 7015: A factory-only feature (Feature Code 6094) allows up to six external storage devices to be attached to those 7015 systems.

CD-ROM drive: A read-only compact disc drive is available which can read disks such as the online system documentation database for InfoExplorer.

High-Capacity Storage: There are several types of high-capacity storage available for the RISC System/6000 system. In the disk drive area these types of disk-drive arrays are available: NFS-dataserver and redundant-array-of-inexpensive disks (RAID). There is an optical library, tape library and backup systems available. For further information on these products, see the section on High-Capacity Storage Arrays, Subsystems, and Servers on page 1-38.

Displays, printers, and plotters: Monochrome and color graphics displays are available in several sizes and resolutions. ASCII terminals, printers, and plotters are also available.

IBM 7010 Xstation 130, 140, and 150: The Xstation is a desktop LAN-attached X terminal providing a low-cost-per-seat solution in many environments.

Note: An Xstation is not considered a RISC System/6000 system unit in the context of this document. It does not implement POWER Architecture.

Other devices: A keyboard is available for all machine types except the rack-based 7015 POWERservers. A wide range of options are available for the RISC System/6000 product line. Some of them are mouse, tablet, spaceball, digitizers, dials, lighted programmable function keyboard, modems and adapters.

Communications: Hardware and software options support Ethernet, Token-Ring, and Fiber Distributed Data Interface (FDDI) local area networks, TCP/IP, SNA, asynchronous

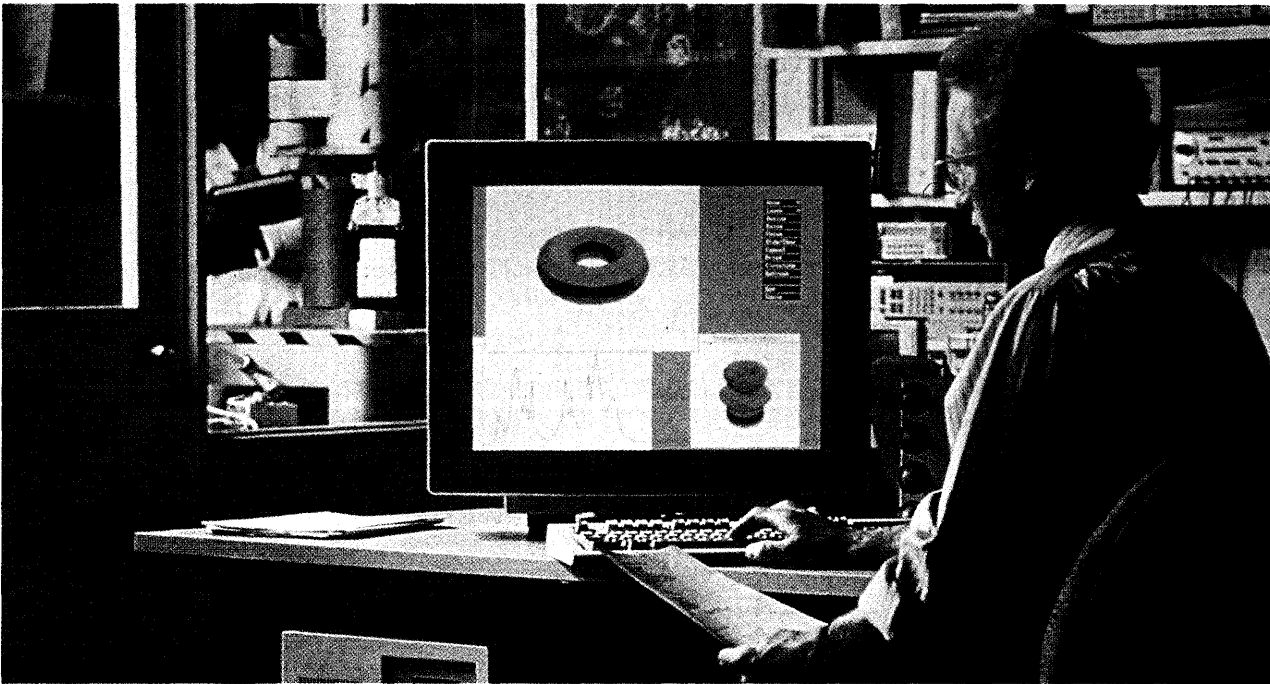
communications, 3278/79 emulation, and Serial Optical Channel. See Chapter 3, "Communications Connectivity Overview," for more details on communications offerings.

Channel Attachments: The following options are available: System/370 Block Multiplexer Channel attachment. S/370 Channel Emulator/A adapter and System/390 ESCON Channel attachment. See Chapter 3 "Communications Connectivity" for details of communications offerings.

Reference Information

The following is a list of references and summaries that provide more detailed information on RISC System/6000 systems and external devices.

Name	Page Number
Comparison of RISC System/6000 Systems	1-16
System Unit Disk Drive Usage Summary	1-84
System Unit Disk Drive Specifications	1-85
System Unit Tape CD-ROM and Read/Write Optical Usage Summary	1-96
System Unit Memory Card Usage Summary	1-108
Adapter Usage Summary	1-143
Cables and Cable Assemblies	1-218
System Unit and Device Specifications	1-260
Keyboard Information	1-301
System Unit Configuration Options	1-302



The POWERstation 52H with a 6091 Color Display, Model 23, and Other Optional Features in an Office Environment.

Standard System Unit Features

All RISC System/6000 system units have the following features:

- One 3.5-inch internal diskette drive.*
- One parallel printer port.
- Two EIA-232D asynchronous serial ports.
- One tablet port.**
- One mouse port.**
- One keyboard/speaker port.**
- One Small Computer Systems Interface (SCSI) single ended (SE) controller. It is integrated on all currently available models; therefore, a Micro Channel slot is not used.***
- Operator panel with the following features:
 - A 3-digit 7-segment LED display.
 - A 3-position key lock to help provide logical security. The positions are: Normal (general operation), Secure (unattended or restricted), and Service (hardware or software service). No key lock is available on M20 and M2A.
 - A reset button.
- Rollers or glides on all 7013 desktide models for ease of moving.
- Battery, which supports up to 32KB of nonvolatile memory for important system information, like the system configuration and a time-of-day clock (up to 8KB is supported on the Models M20, M2A, 220, and 230).
- Power cord with attached plug. See page 1-255 for more information.
- System diagnostics, both online and standalone, which are provided with the IBM AIX Version 3.2 for RISC System/6000 licensed program or can be ordered separately on diskettes. Online diagnostics can be run concurrently with AIX, while standalone diagnostics must be run by restarting the system.
- Warranty, installation, and service support from IBM. System units are warranted; for detailed warranty information consult your IBM marketing representative. IBM's highly

skilled professionals are available to help you with your system expansion, operations, and applications questions.

*Optional on the Models 220, 230, and 250. Not available on Models M20 and M2A.

**Not available on the 7015 rack-based system units

***Models 580, 58H, 590, 970B, 980B, and 990 have both an integrated SCSI-1 and a SCSI-2 I/O Controller card.

Note: Console capability is required for diagnostics and configuration tasks. Console capability can be provided by either a supported ASCII terminal or a combination of a supported display, display adapter, and keyboard. The console must be appropriately attached to the system unit.

Comparison of RISC System/6000 Systems

The following table provides a summary of the differences among the range of RISC System/6000 system units. Detailed descriptions of each system unit are found following the table. See page 1-260 for information on physical, electrical, and environmental considerations for the system units.

Feature	Models M20, M2A	Models 220, 22W	Model 230, 23W/S/T	Model 250, 25W/S/T	Model 34H
System orientation	Desktop	Desktop or deskside	Desktop or deskside	Desktop or deskside	Desktop or deskside
Processor	33 MHz (RSC)	33 MHz (RSC)	45.45 MHz (RSC)	66 MHz	41.67 MHz
Data cache ¹	8KB	8KB	8KB/128KB ³	32KB	32KB
Instruction cache ¹					32KB
Memory bus width	64 bits	64 bits	64 bits	64 bits	64 bits
Standard system memory	16MB	16MB	16MB	16MB	16MB
Maximum system memory	64MB	64MB	64MB	256MB	256MB
Standard internal disk drive capacity	0MB	220-0MB W-200MB	230-0MB W/T-400MB S-1GB	250-0MB W/T-540MB S-1GB	400MB
Maximum internal disk drive capacity	0MB	2GB	2GB	2GB	4GB
Maximum disk storage ²	7.0GB	20GB	20GB	30GB	73GB
Available Micro Channel adapter slots	1	2	2/1	2/1/2	4
Serial Optical Link ports	0	0	0	0	0
Integrated SCSI	Yes	Yes	Yes	SCSI-2	Yes
Integrated Ethernet	Yes	Yes	Yes	Yes	Yes
SCSI-2 Adapter (STD)	No	No	No	Yes	No

Notes:

1. Some models use a combination of data and instruction cache referred to as mixed cache. The Models M20, M2A, 220, and 230 have 8KB of mixed cache, Model 250 has 32KB of mixed cache. In addition, the Model 230 has 128KB of level-2 cache.
2. The maximum disk storage capacity shown in the table does not reflect the capacity that is available when using Storage Arrays or the POWER Network Dataserver products.
3. The Model 230 has a secondary level-2 cache which supports data and instructions.

Feature	Model 355	Models 360/36T	Model 365	Models 370/37T	Model 375	Model 52H	Model 550L
System orientation	Desktop or deskside	Desktop or deskside	Desktop or deskside	Desktop or deskside	Desktop or deskside	Deskside	Deskside
Processor	41.67 MHz	50 MHz	50 MHz	62.5 MHz	62.5 MHz	25 MHz	41.67 MHz
Data cache	32KB	32KB	32KB	32KB	32KB	32KB	32KB
Instruction cache	32KB	32KB	32KB	32KB	32KB	8KB	32KB
Memory bus width	64 bits	64 bits	64 bits	64 bits	64 bits	64 bits	64 bits
Standard system memory	16MB	16MB	16MB	32MB	32MB	16MB	32MB
Maximum system memory	128MB	256MB	128MB	256MB	128MB	512MB	256MB
Standard Internal disk drive capacity	400MB	400MB	400MB	400MB	400MB	400GB	2GB
Maximum Internal disk drive capacity	4GB	4GB	4GB	4GB	4GB	6GB	12GB
Maximum disk storage*	18GB	73/41GB	18GB	73/41GB	18GB	50GB	140GB
Available Micro Channel adapter slots	1	4/3	1	4/3	1	7	4
Serial Optical Link ports	0	0	0	0	0	2	0
Integrated SCSI	Yes	Yes	Yes	Yes	Yes	No	Yes
Integrated Ethernet	Yes	Yes	Yes	Yes	Yes	No	Yes
SCSI-2 Adapter (STD)	No	No	No	No	No	No	No

* The maximum disk storage capacity shown in the table does not reflect the capacity that is available when using Storage Arrays or the POWER Network Dataserver products.

Feature	Model 570	Model 580	Model 58H	Model 590	Models 970B/980B	Model 990
System orientation	Deskside	Deskside	Deskside	Deskside	Rack-mounted	Rack-mounted
Processor	50 MHz	62.5 MHz	55 MHz	66 MHz	50/62.5 MHz	71.5 MHz
Data cache	32KB	64KB	256KB	256KB	64KB	256KB
Instruction cache	32KB	32KB	32KB	32KB	32KB	32KB
Memory bus width	64 bits	128 bits	128/256 bits ²	128/256 bits ²	128 bits	128/256 bits ²
Standard system memory	32MB	64MB	64MB	64MB	128MB	128MB
Maximum system memory	1024MB	1024MB	2048MB	2048MB	1024MB	2048MB
Standard internal disk drive capacity	2GB	2GB	2GB	2GB	4GB	4GB
Maximum internal disk drive capacity	12GB	12GB	12GB	12GB	44.9GB	44.9GB
Maximum disk storage ¹	204GB	204GB	204GB	204GB	243GB	243GB
Available Micro Channel adapter slots	8	7	7	7	7/15	15
Serial Optical Link ports	2	2	0	0	4	0
Integrated SCSI	Yes	Yes	Yes	Yes	Yes	Yes
Integrated Ethernet	No	No	No	No	No	No
SCSI-2 Adapter (STD)	No	Yes	Yes	Yes	Yes	Yes

Notes:

1. The maximum disk storage capacity shown in the table does not reflect the capacity that is available when using Storage Arrays or the POWER Network Dataserver products.
2. When configured with 2 memory cards (base configuration) the memory bus is 128-bits. When configured with 4 or 8 memory cards the memory bus is 256-bits.

The IBM RISC System/6000 7008 Models M20 and M2A



A Model M20 with an Optional Keyboard and Mouse

The Models M20 and M2A are entry-level workstations that are binary-compatible with the other RISC System/6000 system units. The M2A is a Southern Hemisphere model. The system unit can be configured as a LAN-attached diskless workstation or as a diskfull system with supporting external SCSI devices. LAN attachment is required for service.

As diskless workstations, the Models M20 and M2A can be started up and loaded from an IBM AIX server on either a Token-Ring or Ethernet local area network (LAN). It can also access diagnostics through a network connection.

Features

- RISC Single Chip (RSC) 33.33-MHz processor.
- 16MB standard system memory, expandable to 64MB using the eight memory SIMM slots. The unit can use 4MB or 8MB System Memory Expansion Kits.
- One integrated SCSI-1 single ended (SE) adapter.
- Integrated 17-inch, 1024x768, 256-color display
- Model 220 Gt1 graphics performance.
- Tilt/swivel base.
- One integrated Ethernet IEEE 802.3 port, with a communication rate of 10M bps. A thick (10Base5) connector is standard; optional transceivers for use with thin (10 Base 2) or twisted-pair (10BaseT) connectors are available.
- One Type 3 Micro Channel adapter slot.
- Standard keyboard and three-button mouse
- One parallel port.
- One tablet port.
- Electronics for two serial ports with optional fan out cable.
- FCC Class A.

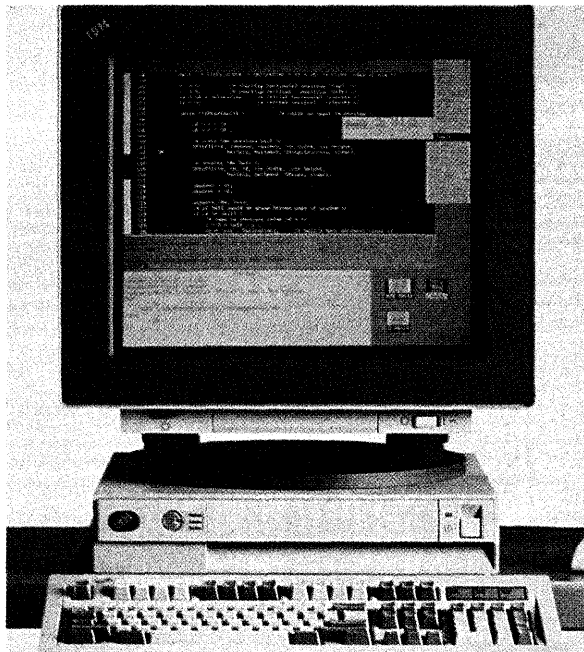
Options

- 4MB or 8MB System Memory Expansion Kits:
 - Maximum of eight SIMMs installed (two standard, six optional)

- Usable in any combination (matched pairs required)
- Maximum memory expansion of up to 64MB.
- A wide variety of optional features, including graphics, communications, and storage devices are available to provide the customer with highly configurable and robust systems.
- Security cable, a 1520-mm (5-ft) hardened-steel cable featuring a snap-on metal retainer that attaches to the back of the system unit, allowing you to secure the system.
- One serial-port fan-out cable to allow connections to two EIA-232D asynchronous serial ports.

See “Reference Information” on page 1-13 for a list of the locations of various summaries and reference information for the RISC System/6000 systems and external devices.

The IBM RISC System/6000 7011 Models 220 and 230



A Model 220 with an Optional 6091 Color display, Model 19, and an Optional Keyboard and Mouse

The Models 220 and 230 are entry-level workstations that are binary-compatible with the other RISC System/6000 system units. The system units can be configured as LAN-attached diskless workstations or as standalone systems.

As diskless workstations, the Models 220 and 230 can be started up and loaded from an IBM AIX server on either a Token-Ring or Ethernet local area network (LAN). They can also access diagnostics through a network connection.

7011 POWERstation/POWERserver 230 is a more powerful version of the 7011 Model 220, achieving enhanced performance via a 45.5-MHz processor and 128KB of level-2 cache.

POWERstations 23T, 22W, 23W, and POWERserver 23S are designed to meet customer needs for low-priced, special-purpose, preconfigured models without limiting the customers ability to add to the configuration to satisfy his unique requirements.

The POWERstation 23T is a workstation model with a Gt1x graphics adapter, 400MB disk, keyboard, mouse, and the POWERdisplay 17 standard, with an option to select POWERdisplay 19.

The POWERstation 22W is a workstation model with a Gt1 graphics adapter, 200MB disk, keyboard, and mouse.

The POWERstation 23W is a workstation with a Gt1x graphics adapter, 400MB disk, keyboard, and mouse.

The POWERserver 23S comes complete with a 1GB SCSI-2 disk drive and 8-port RS-232 adapter.

The model 23E is an upgrade from the POWERstation/POWERserver 220 series to provide 230 performance for existing 220 customers.

The POWER Gt1x high-performance 8-bit, 256 Color 2D graphics adapter supports 1280x1024, 1024x768, and 1152x900 non-interlaced displays. This graphics adapter performs at approximately 2 to 3 times the speed of the POWER Gt1 Graphics Adapter.

Features

- RISC Single Chip (RSC) 33.33-MHz processor for the Model 220 and 45.45-MHz processor for the Model 230.
- 16MB standard system memory, expandable to 64MB using the eight memory SIMM slots. The unit can use 4MB or 8MB System Memory Expansion Kits.
- One integrated SCSI-1 single ended (SE) adapter.
- One integrated Ethernet IEEE 802.3 port, with a communication rate of 10Mbps. A thick (10Base5) connector is standard; optional transceivers for use with thin (10Base2) or twisted-pair (10BaseT) connectors are available.
- Two Type-3 Micro Channel adapter slots.

Options

- One 3.5-inch 2.88MB internal diskette drive
- One internal disk drive (200MB, 400MB, 540MB, 1GB or 2GB SCSI SE disk drive)
- 4MB or 8MB System Memory Expansion Kits:
 - Maximum of eight SIMMs installed (two standard, six optional)
 - Usable in any combination (matched pairs required)
 - Maximum memory expansion of up to 64MB.
- POWER GTO
- Additional display support through the POWER Gt1, Gt1b and Gt1x adapters. The POWER Gt1 and Gt1b are unique to Model 220 while the POWER Gt1x is available on either model 220 or 230 and supports the following IBM displays:
 - 6091 Model 19
 - 6091 Model 19i
 - 6091 Model 23 (with RPQ 8K1744)
 - 8507
 - 8508
 - POWERdisplay 17.
 - POWERdisplay 19.
- The following are Class B monitors, use with the Gt1b adapter if a Class B system is desired:
 - 8514
 - 8515
 - 8517.

See "Reference Information" on page 1-13 for the locations of various summaries and reference information for the RISC System/6000 systems and external devices.

The POWER Gt1 and Gt1x adapters also support a wide variety of OEM displays.

The Gt1 and Gt1x are FCC Class A adapters. The Gt1b is FCC Class B.

- A pedestal used for stabilization in the deskside (vertical) position.
- A security cable, a 1520-mm (5-ft) hardened-steel cable featuring a snap-on metal retainer that attaches to the back of the system unit, allowing you to secure the system.

The IBM RISC System/6000 7011 Model 250

The Model 250 series uses the IBM 601 PowerPC processor and is IBM's first implementation of PowerPC Architecture. This series supports the customer's business objectives by providing an entry-level high-performance, desktop workstation/server solution for compute-intensive technical applications or multiuser commercial server applications.

The Model 250 series desktop workstations are binary-compatible with the IBM RISC System/6000 POWERstation/POWERserver family of systems, with application portability and high throughput levels.

POWERstations 25T and 25W and the POWERserver 25S are designed to meet customer needs for preconfigured models that address common requirements without limiting the customer's ability to satisfy his unique requirements. The 25E provides an upgrade path from the POWERstation and POWERserver 220 or 230 series to provide Model 250 performance for existing 220 or 230 customers.

The POWERstation 25T Graphics Workstation is a model with a POWER GXT150 graphics adapter with appropriate cable, 540MB disk, keyboard, mouse, and the POWERdisplay 17 standard, with an option to select POWERdisplay 19.

The POWERstation 25W is a workstation model with a POWER GXT100 graphics adapter, 540MB disk, keyboard, and mouse.

The POWERserver 25S is an entry-level commercial server and comes complete with a 1GB SCSI-2 SE disk drive and an 8-port RS-232 adapter.

The POWER GXT100 and POWER GXT150 graphics adapters are 8-bit, 256 Color 2D graphics adapters that support 1024x768 and 1280x1024 resolution respectively on appropriate displays. The POWER GXT150 graphics adapter also supports 1152x900 resolution displays.

The POWER GXT100 and POWER GXT150 adapters also support a wide variety of OEM displays. Ask your sales representative for a complete list of displays supported.

Features

- 66-MHz 601 PowerPC processor .
- 16MB standard system memory.
- One integrated SCSI-2 controller.
- One integrated Ethernet IEEE 802.3 port, with a communication rate of 10Mbps. A thick (10Base5) connector is standard on the system and a twisted pair (10BaseT) adapter is included standard with each system; an optional transceiver for use with thin (10base2) connectors is available.
- Type-3 Micro Channel adapter slots. Model 25S has one slot available, Models 25T and 25W have two slots available.
- One diskette bay available for expansion.
- Standard device ports and connectors
 - Keyboard/speaker port
 - Mouse port

- Tablet port
- Two serial ports
- Parallel printer port
- SCSI-2 SE port
- Ethernet port

Options

- One 3.5-inch 2.88MB internal diskette drive
- One internal disk drive (200MB, 540MB, 1GB or 2GB SCSI disk drive)
- Memory expandable to 256M bytes
 - Maximum of eight SIMMs installed (four standard, four optional)
- A pedestal used for stabilization in the deskside (vertical) position.
- A security cable, a 1520-mm (5 ft) hardened-steel cable featuring a snap-on metal retainer that attaches to the back of the system unit, allowing you to secure the system.

See "Reference Information" on page 1-13 for a list that refers to the locations of various summaries and reference information for the RISC System/6000 systems and external devices.

The IBM RISC System/6000 7012 Model 34H

The Model 34H is a low-cost, high-performance desktop or deskside system featuring an integrated SCSI SE controller and an integrated Ethernet adapter that does not require Micro Channel slot.

As a POWERstation with 400MB disk drive capacity, the system unit can be configured as a LAN-dependent client system, one which can be started up from an IBM AIX server.

The 34H can also be configured as a powerful standalone graphics workstation. As a POWERserver, the Model 34H can be configured with up to 4GB of internal disk storage. This system can be configured as a compact LAN-server or for multiuser applications.

A pedestal used for stabilization in the deskside (vertical) position is provided with the system unit.

Features

- A 41.67-MHz IBM Processor.
- 16MB standard system memory, expandable to 256MB total using the two memory slots. The units can use 16MB, 32MB, 64MB, or 128MB cards.
- One 3.5-inch 1.44MB standard internal diskette drive.
- 400MB standard disk drive capacity provided by one 3.5-inch internal disk drive. Capacity is expandable to 4GB through a total of two 2.0GB 3.5-inch internal disk drives.
- One integrated SCSI SE I/O controller, with support for two additional SCSI adapters (the IBM SCSI or SCSI-2 High-Performance I/O Controller).
- One integrated Ethernet IEEE 802.3 port, with a communication rate of 10 Mbps. A riser card with both thick and thin connectors is standard; an optional riser card for use with twisted-pair connectors is available. The system unit can also have up to three IBM Ethernet High-Performance LAN Adapters.
- Four Type-3 or Type-5 Micro Channel adapter slots.

See "Reference Information" on page 1-13 for the locations of various summaries and reference information for the RISC System/6000 systems and external devices.

Options

- Security cable, a 1520-mm (5-ft) hardened-steel cable featuring a snap-on metal retainer that attaches to the back of the system unit, allowing you to secure the system.

The IBM RISC System/6000 7012 Model 360

The Model 360 is a low-cost, high-performance desktop system featuring an integrated SCSI-1 controller and an integrated Ethernet adapter not requiring Micro Channel slots.

As a POWERstation with 400MB disk drive capacity, the system unit can be configured as a LAN-dependent "client system."

The system can be used as a powerful standalone graphics workstation, with optional LAN and other communications capabilities. As a POWERserver with up to 4GB of internal disk drive storage, the system can be configured as a LAN-server or for multiuser applications.

Features

- A 50-MHz IBM processor
- 16MB standard system memory, expandable to 256MB total using the two memory slots. The unit can use 16, 32, 64, or 128MB cards.
- One 3.5-inch 1.44MB standard internal diskette drive.
- 400MB standard disk drive capacity provided by one 3.5-inch internal disk drive. Capacity is expandable to 4GB through a total of two 2.0GB 3.5-inch internal disk drives.
- One integrated SCSI-1 I/O controller, with support for two additional SCSI adapters (the IBM SCSI-1 or SCSI-2 High-Performance I/O controller).
- One integrated Ethernet (IEEE 802.3) adapter, with a communication rate of 10 Mbps. A riser card with both thick and thin connectors is standard; an optional riser card for use with twisted-pair connectors is available. The system unit can also have up to three IBM Ethernet High Performance LAN adapters.
- Four Type-3 or Type-5 80MBps Micro Channel adapter slots.

Options

- Security cable, a 1520-mm (5 ft) hardened-steel cable featuring a snap-on metal retainer that attaches to the back of the system unit allowing you to secure the system.

See "Reference Information" on page 1-13 for the locations of various summaries and reference information for the RISC System/6000 systems and external devices.

The IBM RISC System/6000 7012 Models 355, 365, and 375

The POWERstation 355, 365, and 375 systems are newly packaged desktop workstation members of the RISC System/6000 family. They offer excellent price/performance for a broad range of technical workstation applications.

These POWERstations have three levels of processor performance and feature enhanced cache architecture with an instruction-cache-buffer size of 32KB. The performance of some applications is improved by increasing the number of cache hits between system memory and the instruction cache unit.

These POWERstation models are offered in easy to order system packages which include the following:

- 1-2 user AIX/6000 license
- AIXwindows 2D license
- High-Resolution IBM POWERdisplay 17
- Keyboard
- Mouse
- Integrated SCSI-1 SE controller
- 1 memory slot
- 16MB system memory on Models 355 and 365
- 32MB system memory on Model 375
- Two Type-3 or Type-5 80MBps Micro Channel slots (one available)
- One 3.5-inch 1.44MB internal diskette drive.

The system processors are as follows:

- A 41.67 MHz IBM processor in the Model 355
- A 50 MHz IBM processor in the Model 365
- A 62.5 MHz IBM processor in the Model 375.

Options

- System memory up to 128MB
- Internal disk drive capacity up to 4MB using two 2GB disk drives
- Select to POWERdisplay 19 from POWERdisplay 17.

See "Reference Information" on page 1-13 for the locations of various summaries and reference information for the RISC System/6000 systems and external devices.

The IBM RISC System/6000 7012 Model 370

The Model 370 is the highest performance, low-cost desktop system which features an integrated SCSI-1 SE controller and an integrated Ethernet adapter not requiring Micro Channel slots.

As a POWERstation with 400MB disk drive capacity, the system unit can be configured as a LAN-dependent "client system."

The system can be used as a powerful standalone graphics workstation with optional LAN and other communications capabilities. As a POWERserver, with up to 4GB of internal disk drive storage, the system can be configured as a LAN-server or for multiuser applications.

Features

- A 62.5-MHz IBM processor
- 32MB standard system memory, expandable to 256MB total using the two memory slots. The unit can use 16, 32, 64, or 128MB cards.
- One 3.5-inch 1.44MB standard internal diskette drive.
- 400MB standard disk drive capacity provided by one 3.5-inch internal disk drive. Capacity is expandable to 4GB through a total of two 2.0GB 3.5-inch internal disk drives.
- One integrated SCSI-1 SE I/O controller, with support for two additional SCSI adapters (the IBM SCSI or SCSI-2 High-Performance I/O Controller).
- One integrated Ethernet (IEEE 802.3) adapter, with a communication rate of 10 Mbps. A riser card with both thick and thin connectors is standard; an optional riser card for use with twisted-pair connectors is available. The system unit can also have up to three IBM Ethernet High Performance LAN adapters.
- Four Type-3 or Type-5 Micro Channel adapter slots.

Options

- Security cable, a 1520-mm (5-ft) hardened-steel cable featuring a snap-on metal retainer that attaches to the back of the system unit, allowing you to secure the system.

See "Reference Information" on page 1-13 for the locations of various summaries and reference information for the RISC System/6000 systems and external devices.

The IBM RISC System/6000 7012 Models 36T and 37T

The POWERstation 36T and 37T systems are newly packaged desktop 3D graphics workstations and are members of the RISC System/6000 family. These systems are powerful technical workstation offerings, used for interactive 3D applications. Intensive applications, such as Computer Augmented Design and Manufacturing (CADAM), Computer-Graphics Aided Three-Dimensional Interactive Application (CATIA), and 3D modeling applications are supported on these new systems.

The POWERstation 36T and 37T systems are offered in easy-to-order system packages, which include a POWERdisplay 17 high-resolution 17-inch color display, POWER Gt4e-8-bit 3D color graphics adapter, keyboard, mouse, 32MB of memory, and a 400MB fixed disk. Customers will be able to select an optional Gt4xi-8-bit, Gt4xi-24-bit, or Gt4i-24-bit 3D color graphics adapter at an additional charge in place of the standard Gt4e 8-bit 3D adapter.

See "Reference Information" on page 1-13 for the locations of various summaries and reference information for the RISC System/6000 systems and external devices.

The Rack Mount/Environmentally-Hardened 7012 Feature

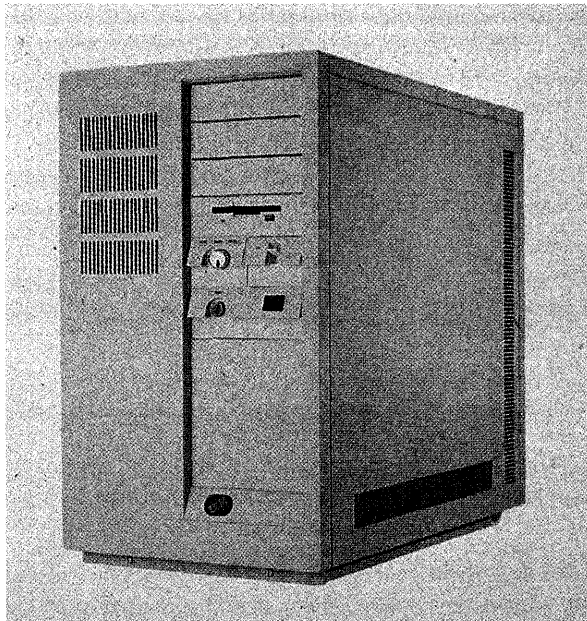
7012 POWERserver models can be ordered as environmentally-hardened servers to bring the power of IBM's advanced RISC technology to a wide range of field applications.

This equipment is commercial-off-the-shelf (COTS) operating hardware that has been repackaged to operate in hostile environments. The environmentally-hardened RISC System/6000 models maintain 100-percent functional equivalency with their standard counterparts. These units support the same Micro Channel interface adapter cards, memory upgrades, and options used in the standard models.

Standard Features

- Mounts in a standard 19-inch equipment rack
- High capacity fan to enhance cooling
- Card retention system to withstand vibration and shock
- Advanced disk drive mounting system to withstand vibration and shock
- Dust cover over diskette reader and provisions for air filter
- Excellent price, performance, and environmental characteristics

The IBM RISC System/6000 7013 POWERstation and POWERserver 52H



The Model 52H deskside is designed for greater expansion and growth.

The Model 52H is a deskside model designed for greater expansion and growth. The system unit can expand to meet a variety of technical and commercial application needs.

Features

- A 25-MHz implementation of the IBM POWER Architecture.
- 16MB standard system memory, expandable to 512MB total using the eight memory slots. The unit can use 16, 32, or 64MB cards.
- 400MB standard disk drive capacity provided by one 3.5-inch internal disk drive. Capacity is expandable to 10.4GB of disk storage. The Model 52H system has three internal disk drive bays. Each bay can support one 5.25-inch disk drive (857MB, 1.37GB or 2.4GB) or one or two 3.5-inch disk drives (2.0GB each, or 4.0GB per bay). Options allow you to upgrade the standard disk drive to many of the drives mentioned.
- One 3.5-inch 1.44MB standard internal diskette drive.
- Seven Type-3 and Type-5 Micro Channel adapter slots.
- One Small Computer Systems Interface (SCSI) adapter card, the IBM SCSI High-Performance I/O Controller, which occupies one of the eight Micro Channel adapter slots (Slot 8). The unit can support up to five SCSI controllers, each of which can support up to seven SCSI devices.
- Two rollers on the bottom rear of the machine to facilitate ease of moving.
- Rear-mounted lock, which can help provide physical security (front and rear locks are operated by the same key).

Options

- Up to two serial optical link ports, using the IBM Serial Optical Channel Converter.
- See page 1-302 for supported internal media configurations.

See table on page 1-13 for a list that refers to the locations of various summaries and reference information for the RISC System/6000 systems and external devices.

The IBM RISC System/6000 7013 Model 550L

The Model 550L is an entry-level, open-systems desktide server. The design of the Model 550L emphasizes price and performance.

The IBM RISC System/6000 550L comes in an easy-to-order system package and features the enhanced cache architecture with an instruction-cache-buffer size of 32KB. This improves the performance of some applications by increasing the number of cache hits between system memory and the instruction cache unit. This is an excellent system where entry-level processor power, large disk storage capacity, and the ability to upgrade are all important factors.

Features

- A 41.6-MHz IBM processor
- Four available 80MBps Micro Channel slots
- 32MB RAM expandable to 256MB
- 1.44MB 3.5-inch diskette drive
- Integrated SCSI-1 SE I/O controller
- Integrated Ethernet adapter (thick or thin)
- CD-ROM standard
- 2GB standard disk drive capacity, provided by a pair of 3.5-inch, 1.0GB internal disk drives. Machine supports a total of six 3.5-inch bays or three 5.25-inch bays. Internal capacity is expandable to 12GB of disk storage. Each bay can support one 5.25-inch disk drive (1.37 or 2.4GB) or one or two 3.5-inch disk drives (2GB each for 4.0GB total per bay).
- Two rollers on the bottom rear of the machine to facilitate ease of moving.
- Rear-mounted lock, which can help provide physical security (front and rear locks are operated by the same key).

Options

A wide variety of optional features, including graphics, communications, and storage devices are available to provide the customer with highly configurable and robust systems.

Two serial optical link ports, using the IBM Serial Optical Channel Converter.

See "Reference Information" on page 1-13 for the locations of various summaries and reference information for the RISC System/6000 systems and external devices.

The IBM RISC System/6000 7013 Model 570

The Model 570 is a high-performance deskside system. The POWERstation/POWERserver Model 570 provides an increase in performance over similarly priced RISC System/6000 deskside models.

The Model 570 features the enhanced cache architecture with an instruction-cache-buffer size of 32KB. This improves the performance of some applications by increasing the number of cache hits between system memory and the instruction cache unit.

Features

- A 50-MHz IBM processor
- Eight 80MBps available Micro Channel slots
- Two EIA-232 asynchronous ports
- 32MB RAM expandable to 1024MB total through eight memory slots
- 1.44MB 3.5-inch diskette drive
- Integrated SCSI-1 SE I/O controller
- Standard CD-ROM
- 2GB standard disk drive capacity, provided by a pair of 3.5-inch, 1.0GB internal disk drives. Machine supports a total of six 3.5-inch bays or three 5.25-inch bays. Internal capacity is expandable to 12GB of disk storage. Each bay can support one 5.25-inch disk drive (1.37 or 2.4GB) or one or two 3.5-inch disk drives (2GB each for 4.0GB total per bay).
- Two rollers on the bottom rear of the unit to facilitate ease of moving.
- Rear-mounted lock, which can help provide physical security (front and rear locks are operated by the same key).

Options

A wide variety of optional features, including graphics, communications, and storage devices are available to provide the customer with highly configurable and robust systems.

Two serial optical link ports, using the IBM Serial Optical Channel Converter.

See table on page 1-13 for a list that refers to the locations of various summaries and reference information for the RISC System/6000 systems and external devices.

The IBM RISC System/6000 7013 Model 580

The Model 580 is a midrange multiuser, multitasking numeric computing system. It is a well-balanced system with the Extended (80MBps second peak rate) Micro Channel (XIO). The Model 580 functions well as either a technical workstation (POWERstation) or as a commercial server (POWERserver).

Features

- A 62.5-MHz IBM processor
- 64MB standard system memory (two 32MB cards), expandable to 1024MB total through the eight memory slots. The unit can use 16, 32, 64 or 128MB cards. Memory cards must be used in pairs.

- One 3.5-inch, 1.44MB standard internal diskette drive
- 2GB standard disk drive capacity, provided by a pair of 3.5-inch, 1.0GB internal disk drives. Machine supports a total of six 3.5-inch bays or three 5.25-inch bays. Internal capacity is expandable to 12GB of disk storage. Each bay can support one 5.25-inch disk drive (1.37 or 2.4GB) or one or two 3.5-inch disk drives (2GB each for 4.0GB total per bay).
- Standard CD-ROM
- Standard SCSI-2 I/O controller card for disk drive bays
- Seven 80MB/sec available Micro Channel adapter slots
- Integrated SCSI-1 I/O Controller for internal media
- Two rollers on the bottom rear of the unit to facilitate ease of moving
- Rear-mounted lock, which can help provide physical security (front and rear locks are operated by the same key).

Options

A wide variety of optional features, including graphics, communications, and storage devices are available to provide the customer with highly configurable and robust systems.

Two serial optical link ports, using the IBM Serial Optical Channel Converter.

See "Reference Information" on page 1-13 for locations of various summaries and reference information for the RISC System/6000 systems and external devices.

The IBM RISC System/6000 7013 Model 58H

The Model 58H is a powerful midrange deskside system with emphasis on performance. The standard 64MB expandable memory with a 55 MHz CMOS processor, a 256KB data cache, and a 32KB instruction cache provides a new level of midrange performance. The Model 58H uses POWER2 technology with a full range of standard and optional features that make the RISC System/6000 POWERstation/POWERserver Model 58H a powerful open systems commercial/compute server or a high-performance 3D workstation.

Features

- A 55-MHz POWER2 IBM processor
- 64MB standard system memory (two 32MB cards), expandable to 2048MB total through the eight memory slots. Memory cards must be used as follows:
 - Two cards as a pair
 - Four cards of all the same feature code
 - Eight cards with two sets of four, each set of four having the same feature code.
- 128/256KB data cache and 32KB instruction cache
- One 3.5-inch, 1.44M-byte standard internal diskette drive
- 2G bytes of standard disk drive capacity, provided by a pair of 3.5-inch, 1.0GB internal disk drives
- Standard CD-ROM-2
- Standard SCSI-2 I/O Controller
- Seven 80MBps available Micro Channel adapter slots
- Integrated SCSI-1 SE I/O Controller
- Six 3.5-inch or three 5.25-inch direct access storage bays
- One full-high or two half-high 5.25-inch media bays available
- Two EIA-232 asynchronous ports
- One parallel port
- One keyboard port
- One pointing device port (tablet)
- One mouse port.

Options

A wide variety of optional features, including graphics, communications, and storage devices are available to provide the customer with highly configurable and robust systems.

See "Reference Information" on page 1-13 for locations of various summaries and reference information for the RISC System/6000 systems and external devices.

The IBM RISC System/6000 7013 Model 590

The Model 590 is the high end desktop system with emphasis on performance. The standard 64MB expandable memory with a 66 MHz CMOS processor, a 256KB data cache, and a 32KB instruction cache provide a new level of high end performance. The Model 590 uses POWER2 technology with a full range of standard and optional features that make the RISC System/6000 POWERstation/POWERserver Model 590 a powerful open systems commercial/compute server or a high-performance 3D workstation.

Features

- A 66 MHz POWER2 IBM processor.
- 64MB standard system memory (two 32MB cards), expandable to 2048MB total through the eight memory slots. Memory cards must be used as follows:
 - Two cards as a pair
 - Four cards of all the same feature code
 - Eight cards with two sets of four, each set of four having the same feature code.
- 128/256KB data cache and 32KB instruction cache.
- One 3.5-inch, 1.44MB standard internal diskette drive.
- 2GB of standard disk drive capacity, provided by a pair of 3.5-inch, 1.0GB internal disk drives.
- Standard CD-ROM-2.
- Standard SCSI-2 I/O Controller adapter.
- Seven 80MBps available Micro Channel adapter slots.
- Integrated SCSI-1 I/O controller.
- Six 3.5-inch or three 5.25-inch direct access storage bays.
- One full-high or two half-high 5.25-inch media bays available.
- Two EIA-232 asynchronous ports
- One parallel port
- One keyboard port
- One pointing device port (tablet)
- One mouse port

Options

A wide variety of optional features, including graphics, communications, and storage devices are available to provide the customer with highly configurable and robust systems.

See "Reference Information" page 1-13 for locations of various summaries and reference information for the RISC System/6000 systems and external devices.

The IBM RISC System/6000 7015 Models 970B and 980B

The 7015 system unit is a configuration of high-performance, rack-mounted units that fit in a 1.6-meter rack. It is designed to support engineering, scientific, and large multiuser file server applications.

Features

- One 1.6-m (5.3-ft) rack, which meets the EIA-310C standard.
- Processor enclosure (10 EIA) mounted in rack.

- Battery backup for the processor drawer and up to five other drawers is standard (excluding the 1/2-Inch 9-track tape-drive drawer).
- Support for a maximum of four optional drawers:
 - Up to four 9334 SCSI or 9333 Serial disk drawers (with either 670MB, 857MB, or 1.0GB, 1.37GB, 2.0GB or 2.4GB SCSI drives, or 857MB, 1.07GB or 2.0GB Serial drives, respectively), for a total of 44.9GB internal disk storage per 7015 system unit.
 - One IBM 1/2-Inch 9-track tape-drive drawer.
- Optional configurations utilizing -48 volt input power feature.

Options

Attachment of up to four IBM 7202 Model 900 Expansion Racks. Using IBM 9333 and 9334 drawers, the racks can increase maximum system disk storage for the 7015 system to 243GB. See page 1-101 for details on the 7202 and available drawers.

See "Reference Information" on page 1-13 for locations of various summaries and reference information for the RISC System/6000 systems and external devices.

7015 Rack

The rack is an industry-standard 19-inch rack that is designed to comply with the EIA-310C standard and contains 32 EIA units of vertical mounting space.

The rack has an immediate power-off switch.

Power Distribution Unit

The 7015 Power Distribution Unit provides six AC power outlets for the drawers mounted in the rack.

Size and Weight

The 7015 Power Distribution Unit occupies four EIA units of vertical mounting space in the rack and weighs 5.0 kg (11 lbs).

Battery Backup Unit

The Battery Backup Unit provides up to 1500 watts of standby power for a minimum of 10 minutes. Battery Backup Extender Cables allow support of up to six drawers. The supportable drawers include the processor drawer and up to five other drawers (excluding the 1/2-Inch 9-track tape-drive drawer).

A keyed appliance cord distributes up to 300 DC with no change to the drawer power supply.

Size and Weight

The Battery Backup Unit overlaps the Power Distribution Unit. The unit weighs 45 kg (100 lbs).

Processor Drawer

Models 970B and 980B each come with one processor drawer featuring the following:

- A 50-MHz IBM processor (Model 970B).
- A 62.5-MHz IBM processor (Model 980B).
- 128MB standard memory. The units feature two 64MB cards, and memory is expandable to 1024MB through the eight memory slots. They can use 16, 32, 64MB or 128MB cards. All cards must be used in pairs.
- One 3.5-inch 1.44MB standard internal diskette drive.
- Two EIA-232D asynchronous serial ports.
- One parallel printer port.
- One IBM Internal CD-ROM Drive standard.

- One 5GB 8-mm tape drive.
- One spare optional position.
- Integrated SCSI-1 on I/O board for support of media devices in CPU enclosure.
- The Models 970B and 980B CPU-Media Enclosures come with four 1.0GB SCSI-2 disk drives and a SCSI-2 I/O Controller. This SCSI-2 I/O controller drives the four 1GB SCSI-2 disk drives and uses one Micro Channel slot.
- Seven available Micro Channel adapter slots and eight optional on the Model 970B. Fifteen available Micro Channel adapter slots on the Model 980B.
- Support for four serial optical link ports, using two optional IBM Serial Optical Channel Converters.
- A self-contained 1170-watt power supply
- Support for the 7202 Expansion Racks. See page 1-101 for details.

Feature Code 6094 provides cable access holes and a top-of-rack-containment plate to allow for attaching external SCSI enclosures to the top of an IBM 7015 Rack. IBM 7203, 7204, 7206, 7207, 7208, 7209, and 7210 external I/O devices may be ordered with a Model 970B or 980B having this feature. A separate SCSI I/O Controller must be ordered to support the external devices. A maximum of six PDU power outlets are available with this feature. HANFS is not supported on external I/O devices.

Size and Weight

The 7015 CPU-Media Enclosure occupies ten EIA units of vertical mounting space in the rack and, with the standard configuration, weighs 28.6 kg (63 lbs).

SCSI Device Drawer

The SCSI device drawer, an optional drawer with the 7015 Models 970B and 980B, provides power, packaging, and cabling for various supported SCSI devices to attach to the system unit.

The drawer supports up to four of the following 5.25-inch devices:

- 2.3GB Internal 8-mm tape drive (maximum of three)
- 5GB Internal 8-mm tape drive (maximum of four)
- Internal 1/4-Inch cartridge tape drive (maximum of one per system)
- 4GB Internal 4-mm tape drive
- Internal CD-ROM drive (maximum of four)

See page 1-302 for a table of configuration options for the SCSI device drawer.

The drawer requires one Micro Channel adapter slot for the SCSI High-Performance I/O Controller. The controller and cable are included with the drawer.

Size and Weight

The SCSI device drawer occupies four EIA units of vertical mounting space in the rack and weighs 25 kg (55 lbs), plus the weight of the installed devices.

1/2-Inch 9-Track Tape-Drive Drawer

The 1/2-inch 9-track tape-drive drawer contains an autoloading, autothreading, reel-to-reel tape drive that features the following:

- Standard 9-track tape interchange plus fast save/restore operations
- IBM standard 9-track recording format (8 data plus parity)
- Selectable tape density: 6250 bpi (GCR Mode) or 1600 bpi (PE Mode)
- 1MB buffer
- Tape speed: 123 ips (GCR Mode), 130 ips (PE Mode)
- Nominal data throughput rate of 768KBps (GCR Mode), 208KBps (PE Mode).

Size and Weight

The 1/2-inch 9-track tape-drive drawer occupies six EIA units of vertical mounting space in the rack and weighs 39 kg (85 lbs).

The 1/2-inch 9-track tape-drive drawer does not have support for battery backup operation.

The IBM RISC System/6000 7015 Model 990

The 7015 model 990 system unit is our most powerful rack-mounted system unit. It comes in an industry standard 19-inch 1.6-meter rack. This high performance model features a 66.6-MHz IBM POWER2 processor. It is designed to support engineering, scientific, and large multiuser file server applications.

Features

- One 1.6-m (5.3-ft) rack, which meets the EIA-310C standard.
- Processor enclosure (10 EIA) mounted in rack.
- Battery backup for the processor drawer and up to five other drawers is standard (excluding the 1/2-inch 9-track tape-drive drawer).
- Support for a maximum of four optional drawers:
 - Up to four 9334 SCSI or 9333 Serial disk drawers (with either 670MB, 857MB, or 1.0GB, 1.37GB, 2.0GB or 2.4GB SCSI drives, or 857MB, 1.07GB or 2.0GB Serial drives, respectively), for a total of 44.9GB internal disk storage per 7015 system unit.
 - One IBM 1/2-inch 9-track tape-drive drawer.
- Optional configurations utilizing -48 volt input power feature.

Options

Attachment of up to four IBM 7202 Model 900 Expansion Racks. Using IBM 9333 and 9334 drawers, the racks can increase maximum system disk storage for the 7015 system to 243GB. See page 1-101 for details on the 7202 and available drawers.

See "Reference Information" on page 1-13 for locations of various summaries and reference information for the RISC System/6000 systems and external devices.

7015 Rack

The rack is an industry-standard 19-inch rack that is designed to comply with the EIA-310C standard and contains 32 EIA units of vertical mounting space.

The rack has an immediate power-off switch.

Power Distribution Unit

The 7015 Power Distribution Unit provides six AC power outlets for the drawers mounted in the rack.

Size and Weight

The 7015 Power Distribution Unit occupies four EIA units of vertical mounting space in the rack and weighs 5.0 kg (11 lbs).

Battery Backup Unit

The Battery Backup Unit provides up to 1500 watts of standby power for a minimum of 10 minutes. Battery Backup Extender Cables allow support of up to six drawers. The supportable drawers include the processor drawer and up to five other drawers (excluding the 1/2-inch 9-track tape-drive drawer).

A keyed appliance cord distributes up to 300 DC with no change to the drawer power supply.

Size and Weight

The Battery Backup Unit overlaps the Power Distribution Unit. The unit weighs 45 kg (100 lbs).

Processor Drawer

The Model 990 comes with one processor drawer featuring the following:

- A 71.5-MHz POWER2 IBM processor.
- 128MB standard system memory (two 64MB cards), expandable to 2048MB total through the eight memory slots. Memory cards must be used as follows:
 - Two cards as a pair
 - Four cards of all the same feature code
 - Eight cards with two sets of four, each set of four having the same feature code.
- One 3.5-inch 1.44MB standard internal diskette drive.
- Two EIA-232D asynchronous serial ports.
- One parallel printer port.
- One IBM internal CD-ROM-2 drive.
- One 5GB 8-mm tape drive.
- One spare optional position.
- Integrated SCSI on I/O board for support of media devices in CPU enclosure.
- The Model 990 CPU-Media Enclosure comes with four 1.0GB SCSI-2 disk drives and a SCSI-2 I/O Controller. This SCSI-2 I/O controller drives the four 1.0GB SCSI-2 disk drives and uses one Micro Channel slot.
- Fifteen available Micro Channel adapter slots.
- A self-contained 1170-watt power supply.
- Support for the 7202 Expansion Racks. See page 1-101 for details.

Feature Code 6094 provides cable access holes and a top-of-rack containment plate to allow for attaching external SCSI enclosures to the top of an IBM 7015 Rack. IBM 7203, 7204, 7206, 7207, 7208, 7209, and 7210 external I/O devices may be ordered with a Model 990 having this feature. A separate SCSI I/O controller must be ordered to support the external devices. A maximum of six PDU power outlets are available with this feature. HANFS is not supported on external I/O devices.

Size and Weight

The 7015 CPU-Media Enclosure occupies ten EIA units of vertical mounting space in the rack and, with the standard configuration, weighs 28.6 kg (63 lbs).

SCSI Device Drawer

The SCSI Device Drawer, an optional drawer with the 7015 Model 990, provides power, packaging, and cabling for various supported SCSI devices to attach to the system unit.

The drawer supports up to four of the following 5.25-inch devices:

- 2.3GB internal 8-mm tape drive (maximum of three)
- 5GB internal 8-mm tape drive (maximum of four)
- Internal 1/4-inch cartridge tape drive (maximum of one per system)
- 4GB internal 4-mm tape drive
- Internal CD-ROM drive (maximum of four)

See page 1-302 for a table of configuration options for the SCSI device drawer.

The drawer requires one Micro Channel adapter slot for the SCSI High-Performance I/O Controller. The controller and cable are included with the drawer.

Size and Weight

The SCSI device drawer occupies four EIA units of vertical mounting space in the rack and weighs 25 kg (55 lbs), plus the weight of the installed devices.

1/2-Inch 9-Track Tape-Drive Drawer

The 1/2-inch 9-track tape-drive drawer contains an autoloading, autothreading, reel-to-reel tape drive that features the following:

- Standard 9-track tape interchange plus fast save/restore operations
- IBM standard 9-track recording format (8 data plus parity)
- Selectable tape density: 6250 bpi (GCR Mode) or 1600 bpi (PE Mode)
- 1MB buffer
- Tape speed: 123 ips (GCR Mode), 130 ips (PE Mode)
- Nominal data throughput rate of 768KBps (GCR Mode), 208KBps (PE Mode).

Size and Weight

The 1/2-inch 9-track tape drive drawer occupies six EIA units of vertical mounting space in the rack and weighs 39 kg (85 lbs).

The 1/2-inch 9-track tape-drive drawer does not have support for battery backup operation.

Telecommunications Features for the RISC System/6000

Features are provided for the POWERserver Models 970B, 980B, 990, and IBM 7202 Model 900 Expansion Rack that provide greater installation flexibility. Most of these features are particularly applicable to the standard installation methods used in the telecommunications industry.

- Top cable access and concrete bolt-down (FC 6090)
- Raised-floor bolt-down (FC 6091)
- Top cable access and concrete bolt-down with DC input power (FC 6092)
- Raised-floor bolt-down with DC input power (FC 6093)

The top cable access and concrete bolt-down features provide a convenient method for overhead cabling and secure mounting to solid flooring.

The Raised-Floor Bolt-Down feature provides a method of secure mounting in raised floor installations.

The -48 vdc input-power feature allows for the operation of the 7015 Models 970B, 980B, 990, and 7202 Expansion Rack with -48 vdc as primary power source. This feature is offered in combination with either of the cable access bolt-down features.

- Power Supply
 - DC input for 7015 (FC 6229)
 - DC Power Distribution Panel (FC 9110)

Feature Code 6229 must be specified with feature numbers 6092 and 6093 to provide for the acceptance of -48 vdc as primary input power to the CPU. Alternating current (AC) or input CPU power supply for Models 970B, 980B, or 990 is replaced by -48 vdc input power supply.

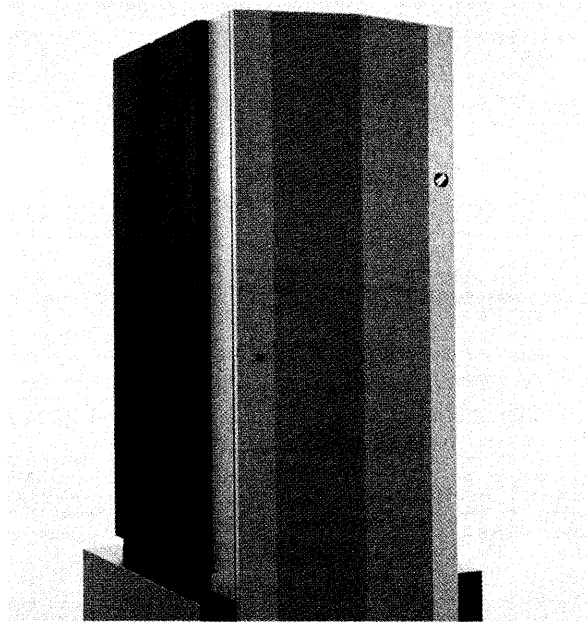
Feature Code 9110 must be specified with features 6092 and 6093 to provide for the distribution of DC power in the rack. The -48 vdc power distribution panel is mounted on top of the 7015 Rack and has circuit breakers for the attached drawers.

- Serial-link disk drawer select with DC input power (FC 6135)

This selection replaces the four SCSI-2 disk drives, and SCSI-2 I/O controller with two 857 Serial disk drives in a 9333 drawer with -48 vdc power supply. FC 6211 High-Performance Subsystem adapter (80MBps) is a requirement for the installation of this feature.

- Any 7015 Model 970B, 980B, and 990 with a -48 vdc input power CPU enclosure (FC 6229) installed will require the attached system components to also have the -48 vdc input power feature installed. These include:
 - IBM Expansion Rack 7202 Model 900 with FC 9110
 - IBM High-Performance Disk Drive Subsystem 9333 Model 010 (Order as an RPQ)

IBM Scalable POWERparallel Systems (SP1)



A 9076 Scalable POWERparallel System (SP1).

The IBM Scalable POWERparallel Systems is a family of technical computing products that offers a scalable platform for both serial and parallel applications featuring balanced interconnection bandwidth and latency. Based on RISC System/6000 technology, the first offering, the 9076 SP1, allows customers to select their processing power to meet current needs, while also offering the opportunity to scale the system upward as their computing needs grow. The 9076 SP1 is highly flexible, enabling various combinations of interactive, batch serial, and parallel jobs to be run concurrently.

The basic component of the 9076 SP1 is a system frame containing 8 to 16 RISC System/6000 processor nodes. Up to four frames may be connected together for a total system of 64 processor nodes. Each node can be used to execute one or more serial jobs, or multiple nodes can be dedicated to parallel jobs. The 9076 SP1 is a scalable system; the availability of multiple configurations offers the customer the flexibility to add frames and processors to meet their growing computing needs.

The 9076 SP1 requires a RISC System/6000 workstation as a control workstation for managing and maintaining the entire 9076 SP1 system. This workstation, when installed with the AIX/6000 operating system and system management software, allows a system administrator to manage the entire 9076 SP1 as a single system. The 9076 SP1 also uses one or more NFS file servers for system booting and for user file I/O.

Communications between processor nodes, and between the nodes and file server, is achieved via LAN connection. Improved performance for parallel job communications is provided by an optional high-performance switch. This switch provides consistent bandwidth and latency between nodes, as the number of nodes is scaled up.

The 9076 runs the AIX/6000 Version 3.2.3 or later versions of the operating system and standard AIX/6000 software. In addition, IBM is offering innovative software for the 9076 SP1 that provides system management and an environment for parallel application development and execution.

Features

- Designed for technical computing workload
- Eight to 64 RISC-based processors providing modular growth from 1 to 8 GFLOPS.
- IBM Loadleveler and AIX parallel environment provide flexible job-management facilities that maximize utilization by supporting combinations of interactive, batch, serial, and parallel jobs.
- Multistage packet switch, supporting high-performance communications between processor nodes, facilitates parallel application development.
- Supports parallel application interfaces, such as Express, PVM, and Linda, to allow rapid porting of many parallel applications.
- Supports FORGE 90 to ease the task of analyzing and parallelizing existing serial FORTRAN source programs.
- Connects to existing open networks directly, using industry-standard communications.

The IBM 7051 POWER Network Dataserver

The 7051 POWER Network Dataserver is a high-performance, high-capacity file server designed to provide industry leading Network File System (NFS) performance for applications requiring large amounts of online data.

The POWER Network Dataserver incorporates a RISC System/6000 system and up to nine additional specialized processors. It can use standard RISC System/6000 Micro Channel adapters such as Token-Ring and FDDI, and can run network administration and distributed storage management programs.

It has a scalable architecture and provides a wide selection of storage options to satisfy application requirements of up to 144GB of disk storage capacity. Its proven asymmetric multiprocessing architecture allows the Dataserver to expand its processing power as the customer's NFS workload increases and disk drive modules can be added incrementally as the customer's storage requirements grow.

The POWER Network Dataserver attaches up to eight Ethernet LANs and is designed to support up to 200 Ethernet-attached NFS clients, depending on the NFS workload.

The POWER Network Dataserver is available in two models, a Model 840 and a Model 800. A base configuration of a Model 840 includes a rack-mounted RISC System/6000 Model 340, one Ethernet processor (with two Ethernet ports), one file processor, one storage processor, 16MB of cache, and 8.0GB of disk storage. A Model 840 has a disk storage capacity of up to 48GB. The Model 800 is an expansion rack which attaches to the Model 840. The Model 800 provides additional disk storage capacity of up to 96GB, giving the Dataserver a maximum disk storage capacity of 144GB.

High-Capacity Storage Arrays, Subsystems, and Servers

IBM 3995 Optical Library Dataserver Models 063 and 163

The IBM 3995 Optical Library Dataserver Models 063 and 163 provide direct-attach rewritable optical storage to the RISC System/6000 environment.

The 3995 Models 063 and 163 complement the existing storage hierarchy by providing online access to vast amounts of information at a lower cost than magnetic disk, yet with direct, random access to data (as opposed to the sequential access of magnetic tape).

The IBM 3995 Optical Library Dataserver Models 063 and 163 provide up to 40GB and 188GB (unformatted) of rewritable optical storage, respectively, using Magneto-optic technology. These models use double-capacity (1.3GB unformatted) rewritable optical disk cartridges which conform to industry standards.

RISC System/6000 Attachments

The Models 063 and 163 are designed for direct attachment to the RISC System/6000 through an SCSI-2 interface.

Although the 3995 Model 063 is available in both single-ended and differential SCSI, differential SCSI is recommended for added distance capability and for the ability to chain up to two Model 063 libraries. Feature Number 7100 or 7101 must be specified when ordering the Model 063 to obtain a differential SCSI interface. The Model 163 is available only with a differential interface and attaches to the RISC System/6000 SCSI-2 Differential High-Performance I/O External Controller.

IBM 9570 Disk Array Subsystem

The IBM 9570 Disk Array Subsystem is designed to support applications requiring very high transfer rates for scientific, technical, and selected commercial computing environments. A single disk array subsystem can contain 12.9GB to 232GB of data and can sustain data transfer rates in excess of 60MBps in configurations of four data modules in one logical group.

The IBM 9570 Disk Array Subsystem supports a programmable RAID-1/RAID-5 architecture (RAID is the acronym for Redundant Array of Independent Disks). This programmable RAID-level capability allows the 9570 to provide both RAID-1 mirrored data and RAID-5 distributed parity in user-defined partitions of array storage space.

RISC System/6000 Attachments

The IBM 9570 Disk Array Subsystem connects to the RISC System/6000 via the IBM High-Performance Parallel Interface (HIPPI) Micro Channel Adapter Set. A single unit can be attached to multiple hosts or multiple units to a single host by using a vendor HIPPI switch.

IBM 8-mm Tape Library System

The LAGO Systems LS/380L Data Wheel Tape Library offers 270GB of inexpensive, unattended backup and online archival storage. The LS/380L 8-mm Tape Library System is an autoloader with a 54 cartridge removable carousel and two full-high 8-mm cartridge tape drives.

Features

The library system has the following features:

- SCSI-2 command interface.

- Legato NetWorker or UniTree tape library management.
- RS-232 command interface.
- Unattended backup.
- User-advanced helical-scan data-recording technology.
- 270GB of storage capacity – up to 5GB per tape.
- 30-year shelf life of tapes.
- The autoloader can notify operator if tape drive needs cleaning.
- The autoloader can notify operator if tape cartridge needs replacing.
- Interchangeable carousel (54 cartridges).
- Peak data transmission rate 4MBps, sustained 500KBps.
- Maximum cartridge search time 136 seconds.
- Average file access time is 0.75 seconds.

RISC System/6000 Attachment

The LS 380/L 8-mm Tape Library System attaches to the RISC System/6000 using an IBM SCSI High-Performance I/O controller. It is recommended that no more than one Library system be attached to an SCSI-2 I/O controller.

MT 0840 Model 001 8-mm Tape Cartridge Handling Subsystem

The EXB-10e is normally used as a standard tape unit to back up magnetic disk drives. It is intended as a backup device that can read or write large blocks of data continuously without interruption.

The EXB-10e 8-mm Tape-Cartridge-Handling Subsystem utilizes an 8-mm tape drive and can hold up to 10 8-mm tape cartridges in a removable cartridge holder. The unit is frequently used for unattended backup and restore operations, providing up to 50GB of data storage. The subsystem requires AIX/6000 Version 3.2 or greater and an industry-standard hierarchical storage program to operate.

Features

The EXB-10e 8-mm Tape-Cartridge-Handling Subsystem has the following features:

- SCSI-2 command interface
- Legato NetWorker or UniTree tape library management
- Unattended backup
- 50GB of storage capacity—up to 5GB per tape
- Peak data transmission rate 4MBps, sustained 500KBps.

RISC System/6000 Attachment

The Subsystem attaches to the RISC System/6000 through a SCSI-2 High-Performance I/O Controller.

IBM 3490E Enhanced Magnetic Tape Subsystem

There are two models of the IBM 3490E Tape Subsystem. These models are low-cost rack-mounted versions of the proven IBM 3490 Magnetic Tape Subsystem originally introduced for the high-end mainframe environment. They use the same high reliability 1/2-inch cartridge system tape. The Model C11 includes one tape drive, an integrated control unit and an integrated six-cartridge automatic cartridge loader. The Model C11 provides 4.8GB of storage or up to 14.4GB of compacted capacity. Assuming compactable data and a three-to-one compacted ratio. Model C22 includes an integrated control unit, two tape drives, and two integrated six-cartridge automatic cartridge loaders. When fully loaded, the C22 provides 9.6GB of storage. With the standard compaction, a fully loaded C22 provides up to 28.8GB of storage.

Model C11 can be upgraded to a C22.

The 3490E Tape Subsystems are an efficient solution for RISC System/6000 customers. The design combines a high-reliability, high-performance tape drive with additional functions for reducing total backup time. The 36-track bidirectional read/write head can reduce or eliminate rewind time. The bidirectional head writes 18 tracks from the load point to the end of the tape and then writes the other 18 tracks from the end of the tape to the load point. The automatic cartridge loader allows the system to go directly to the next cartridge when a cartridge is filled up, thus eliminating the need for an operator to insert a tape. This allows unattended system backup.

These drives also incorporate a single pass read-after-write function in addition to extensive error correction functions. Read-after-write checks the data as it is written. Many errors can be corrected by the integrated control unit at the time the tape is written. If an uncorrectable problem occurs, the operator is notified. The drive does not continue if data cannot be accurately recorded.

RISC System/6000 Attachment

The 3490E Models C11 and C22 attach to the RISC System/6000 by an SCSI-2 Differential High-Performance External I/O Controller. Both models have the capability to add a second differential SCSI-2 adapter and attach to a second nearby RISC System/6000.

IBM 3494 Tape Library Dataserver Model L10

The IBM 3494 Tape Library Dataserver Model L10 is a low-cost automated tape library, providing an automated tape solution to a variety of system environments. The 3494 supports two new models of the IBM 3490E CXX family of tape drives; the 3490E Models C1A and C2A. These tape drives are compatible with existing 3490E models and are upgradable from models C10, C11, and C22.

The 3494 provides a solution for automating tape operations such as save/restore, migration of data between direct access storage devices (DASD) and tape, and other mass data applications. It offers the high capacity of 36-track bidirectional recording, Improved Data Recording Capability (IDRC), providing up to three times compaction and use of both Cartridge System Tape and Enhanced Capacity Cartridge System Tape.

The 3494 is designed to grow as your storage and usage needs grow. The entry-level configuration of one drive and 240 tape cartridges can be expanded to combinations of one to eight drives and storage for 210 to 3040 tape cartridges, providing a maximum capability of 7.2 terabytes (7.2TB) compacted.

RISC System/6000 Attachment

The 3494 Model L10 Tape Library Dataserver attaches to the RISC System/6000 by a S/370 Channel Emulator/A adapter.

IBM 7135 RAIDiant Array

The IBM 7135 RAIDiant Array, ideally suited for RISC System/6000 POWERserver applications requiring large storage capacities and high data availability, is available in two models: the Model 010 and the high-availability Model 110. Both models offer high-reliability disk drives, redundant power supplies, and redundant cooling, and concurrent maintenance on power supplies and cooling. The Model 110 adds concurrent maintenance of drive and controllers.

The RAIDiant Array Model 110, a high-availability model, can be configured to implement up to three different high-availability RAID (Redundant Array of Independent Disks) architectures (RAID-1, RAID-3, and RAID-5) as well as disk striping. With its disk drives configured in a RAID-1, RAID-3, or RAID-5 array, the Model 110 offers continued data availability in the event of a single disk drive failure, and performs automatic data

reconstruction when the disk drive is replaced. Individual disk drives are hot-pluggable and can be replaced by the customer in case of a disk drive failure. The Model 110 includes two 1.3GB drives and can be expanded to a maximum storage capacity of 60GB with 30 2.0GB disk drives.

A fault-tolerant configuration of the Model 110 can be created by adding an optional second controller, which can be configured to take over control if a controller failure is detected. One controller is active and the other is passive in this two controller configuration.

With the optional second controller added, system throughput and I/O response time can be further enhanced by configuring the two controllers in a dual active controller configuration. In this configuration both controllers are dedicated to different groups of drives. If a failure is detected in either controller, control of all disk drives is passed to the alternate.

The high-availability Model 110 is designed to support "mission critical" applications on clusters of RISC System/6000 POWERservers running HACMP/6000 or any similar control program.

The RAIDiant Array Model 010 is an entry-level model which provides SCSI disk storage and can be field upgraded to a high-availability Model 110 as customer applications change to require high data availability. The Model 010 includes two 2.0GB disk drives and can be expanded to a maximum storage capacity of 24GB.

Both models of the RAIDiant Arrays are designed to be mounted in a standard 19-inch rack. Two maximum configurations can be installed in a 7202 Model 900 Expansion Rack. A deskside mini-rack cabinet is an optional feature which provides an enclosure for one RAIDiant Array subsystem.

RISC System/6000 Attachment

The IBM RAIDiant Array 7135 models attach to the RISC System/6000 through a SCSI-2 Differential High Performance External I/O Controller with a SCSI-2 differential cable.

System Units	Devices								
	MT 0840 Model 001	MT 3490E C11 and C22	MT 3494 Model L10	MT 3995 Model 063	MT 3995 Model 163	MT 7135 Model 010	MT 7135 Model 110	MT 9570	LAGO Systems
	EXB-10e								LS/380L
M20/ M2A									
220/230									
22W	1								1
22S	1								1
23T	1								1
23S	1								1
23W	1								1
250	1								1
34H	1		1	2 ¹	1 ²	4 ³	4 ³		1
360/36T	1		1	2 ¹	1 ²	4 ³	4 ³		1
370/37T	1		1	2 ¹	1 ²	4 ³	4 ³		1
355, 365, 375	1		1	2 ¹	1 ²				1
52H	2	2	1	2 ¹	1 ²	8 ³	8 ³		2
550L	2	2	1	2 ¹	1 ²	8 ³	8 ³		2
570	2	2	1	2 ¹	1 ²	8 ³	8 ³		2
580	2	2	1	2 ¹	1 ²	8 ³	8 ³		2
58H	2	2	1	2 ¹	1 ²	8 ³	8 ³		2
590	2	2	1	2 ¹	1 ²	8 ³	8 ³		2
970B/ 980B	4	2	1	2 ¹	1 ²	14 ³	14 ³	2	4
990	4	2	1	2 ¹	1 ²	14 ³	14 ³	2	4

Notes:

1. A maximum of two Model 063s are supported per adapter if using the SCSI-2 Differential High-Performance External I/O controller. Otherwise, only one Model 063 per I/O controller is supported.
2. Per SCSI-2 differential I/O controller.
3. Two per SCSI-2 I/O differential controller.

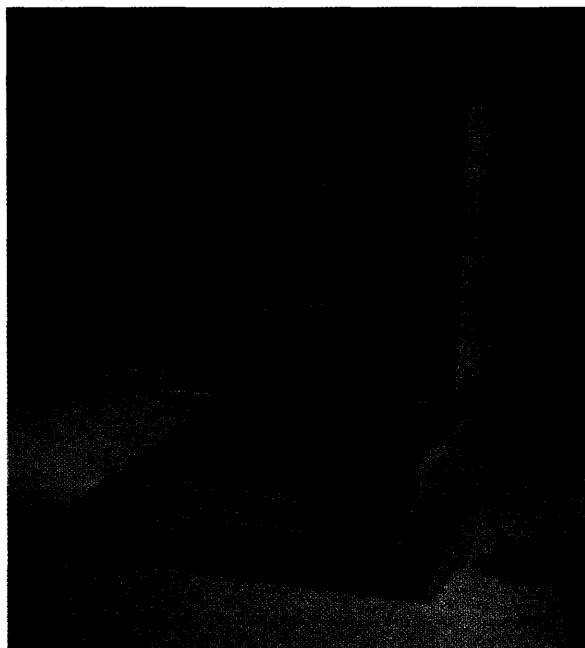
Xstations

IBM 7010 Xstation 130

The IBM 7010 Xstation 130 is a LAN-attached X terminal based on the X Window System model. It functions on a number of all-points-addressable monitors and offers flexible configuration options, including expanded video and system memory and color capability (expandable to 256 colors). The Xstation consists of a desktop logic unit, a keyboard, and a three-button mouse. A monitor is purchased separately.

X server software must be downloaded to the station from a host. The host software requirements for the RISC System/6000 system include the IBM AIX Xstation Manager/6000 licensed program, the IBM AIXwindows Environment/6000 licensed program, and the IBM AIX Version 3 for RISC System/6000 licensed program (with TCP/IP installed).

Note: A minimum of 4MB of memory is required to view multibyte fonts on an Xstation.



An Xstation 130 with a 101-key keyboard, a three-button mouse, and an optional 6091 Color Display, Model 19.

Features

- One Intel 80C186 12.5-MHz I/O processor with 512KB DRAM
- One 32-bit TI 34020 graphics processor with 1MB VRAM (video frame buffer) and 2MB DRAM (window management)
- 2KB of non-volatile memory for configuration and network error logging
- One serial port, with a data rate of up to 19.2 Kbps
- One parallel printer port
- One keyboard/speaker port (keyboard is standard)
- One mouse port (three-button mouse is standard)
- One display port, for use by the following supported displays:
 - 8504 12-inch 640x480
 - 8507 19-inch 1024x768

- 8508 19-inch 1280x1024, 1200x1600
 - 6091-19i 19-inch 1280x1024
 - 6317 17-inch 1024x768 (ISO) 1280x1024*
 - 6324 14-inch 1024x768 (ISO) 1280x1024*
 - 6325 15-inch 1024x768 (ISO) 1280x1024*
 - 9521 21-inch 1280x1024 (ISO)*
 - 9524 14-inch 1024x768 (ISO) 1280x1024*
 - 9525 15-inch 1024x768 (ISO) 1280x1024*
 - 9527 17-inch 1280x1024 (ISO)*
- *Requires V1.7 EPROM
- One Ethernet IEEE 802.3 adapter port. Both thick (10Base5) and thin (10Base2) connectors are available. Only one connector can be used at a time. If needed, a transceiver can be used for a twisted pair (10BaseT) connection. Ethernet runs with a communication rate of 10 Mbps.
 - Domestic and international models (with the latter, the user can choose among 11 languages, including U.S. English, for use in diagnostics).

Options

The following options are available:

- 1, 2, and 4MB System Memory Expansion Kits:
 - Maximum of four options installed
 - Usable in any combination
 - Maximum memory expansion of 16MB.
- One card slot with Riser Card assembly, which supports the following options:
 - IBM Token-Ring Network Adapter/A 16/4.
 - IBM Dual Async Adapter/A.
 - IBM PS/2 Adapter/A for Ethernet Networks.
- 1MB Video Memory Upgrade Kit (expands system VRAM to 2MB and enables panning).
- Second serial port, available using optional serial-port fan-out cable.
- A 30MB direct-attached disk drive, which supports initial program load and memory caching.
- A security cable, a 1520-mm (5-ft) hardened- steel cable featuring a snap-on metal retainer that attaches to the back of the system unit, allowing you to secure the system.

IBM 7010 Xstation 140

The IBM 7010 Xstation 140 is a high-performance, local-area-network (LAN) attached Xterminal. The terminal incorporates a powerful RISC architected, fully cached graphics processor. Four megabytes of system memory and 2MB of video memory are standard. This standard memory configuration allows space for the enhanced function Xserver, local clients, and 256 colors. The terminal can be ordered with a Token-Ring or an Ethernet connection. Attachment support is also provided for a large variety of printers, plotters, modems, and ISO-compliant displays.

The IBM Xstation 140 comes with Xserver software based on the X-Window System Version 11 Release 5 in rewritable nonvolatile flash memory. Important features of the X-Window System Version 11 Release 5 server are its support for generic fonts and the support of a network-based font server. Local graphical setup capability is included as well as simple network-management protocol (SNMP) agent support.

The IBM Xstation 140 requires that AIX Station Manager/6000 Version 1 Release 4 be installed on an IBM RISC System/6000 or other suitable host to provide central configuration capability, printer support, font files, and Xserver updates.

Features

- 33MHz LSI R33020 CMOS RISC processor
- 4MB DRAM (system memory)
- 2MB VRAM (video frame buffer)
- 2MB writable, non-volatile flash memory
- Two 72-pin SIMM sockets for system memory expansion
- One connector for flash memory expansion
- One Keyboard (keyboard is standard)
- One mouse port (3-button mouse is standard)
- One display port, for use by the following supported displays:
 - 8508 19-inch 1280x1024
 - 6019-19i 19-inch 1280x1024 (ISO)
 - 6317 17-inch 1024x768 (ISO) 1280x1024
 - 6324 14-inch 1024x768 (ISO) 1280x1024
 - 6325 15-inch 1024x768 (ISO) 1280x1024
 - 9521 21-inch 1280x1024 (ISO)
 - 9524 14-inch 1024x768 (ISO) 1280x1024
 - 9525 15-inch 1024x768 (ISO) 1280x1024
 - 9527 17-inch 1280x1024 (ISO)
 - POWERdisplay 16S 16-inch 1280x1024 (ISO)
 - POWERdisplay 17 17-inch 1280x1024 (ISO)
 - POWERdisplay 19 19-inch 1280x1024 (ISO)

Options

The IBM Xstation 140 can be ordered from the factory with one of the following connection options:

- The IBM Xstation 140 Ethernet model can be ordered with physical plugs for “Thick” (IEEE 802.3 standard 10BASE5) and “Thin” (IEEE 802.3 standard 10BASE2) cable attachments. A converter is included standard with the Ethernet model for connection to “Twisted Pair” (IEEE 802.3 standard 10BASET). The Ethernet connection supports both the IEEE 802.3 and Ethernet Version 2 protocols.
- The IBM Xstation 140 Token-Ring model can be ordered and has one physical connector for attachment to Token-Ring LAN environments.

The following other options are available:

- 16MB or 32MB of SIMM memory
- Flash memory cards (2MB, 4MB)
- Second serial port, available using optional serial-port fan-out cable.

IBM 7010 Xstation 150

The IBM 7010 Xstation 150 is a LAN-attached, RISC-based, Xterminal based on the Xwindows system model. It functions with a number of all-points-addressable monitors and offers flexible configuration options, including expanded system memory and a selectable Token-Ring or Ethernet Adapter card. The Xstation consists of a desktop logic unit, a keyboard, and a three-button mouse. A monitor is purchased separately.

X server software is resident in FLASH memory. Upgrades can be downloaded to the Xstation from a host. The host software requirements for the RISC System/6000 system include the IBM AIX Xstation Manager/6000 licensed program, the IBM AIXwindows Environment/6000 licensed program, and the IBM AIX Version 3 for RISC System/6000 licensed program (with TCP/IP installed).

Features

- 40-MHz Motorola 88110 fully cached RISC processor with 6MB DRAM

- 2MB VRAM (video frame buffer) with panning
- 2KB of nonvolatile memory for configuration and network error logging
- Three serial ports, with a data rate of up to 38.4Kbps (one 25-pin connector and two 8-pin connectors for tablet, LPF keys, etc.)
- One parallel printer port
- One keyboard/speaker port (keyboard is standard)
- One mouse port (three-button mouse is standard)
- One display port, which is ISO-compliant, with 256 colors for use by the following supported displays:
 - 8508 19-inch 1280x1024
 - 6019-19i 19-inch 1280x1024 (ISO)
 - 6317 17-inch 1024x768 (ISO) 1280x1024
 - 6324 14-inch 1024x768 (ISO) 1280x1024
 - 6325 15-inch 1024x768 (ISO) 1280x1024
 - 9521 21-inch 1280x1024 (ISO)
 - 9524 14-inch 1024x768 (ISO) 1280x1024
 - 9525 15-inch 1024x768 (ISO) 1280x1024
 - 9527 17-inch 1280x1024 (ISO)
 - POWERdisplay 16S 16-inch 1280x1024 (ISO)
 - POWERdisplay 17 17-inch 1280x1024 (ISO)
 - POWERdisplay 19 19-inch 1280x1024 (ISO)
- X11R5 X server in FLASH memory (2MB)
- Domestic and international models.
- One card slot with Riser Card assembly, which supports the following options:
 - IBM Ethernet adapter
 - IBM Token-Ring adapter (4 or 16 Mbps)

Options

The following options are available:

- One Ethernet IEEE 802.3 adapter card. Both thick (10Base5) and thin(10Base2) connectors are available. Only one connector can be used at a time. A twisted-pair converter is included (10BaseT). Ethernet runs with a communication rate of 10 Mbps.
- 4MB and 8MB System Memory Expansion Kits:
 - Maximum of two options installed
 - Usable in any combination
 - Maximum memory expansion to 22MB using Personal System/2 memory SIMMS.
- Fourth serial port, available using optional 25-pin serial-port fan-out cable.
- FLASH memory cards (2MB, 4MB).
- A security cable, a 1520-mm (5-ft) hardened steel cable featuring a snap-on metal retainer that attaches to the back of the system unit, allowing you to secure the system.
- Video adapter cable for conversion from 15-pin (display) to 13W3 (Xstation).

See page 1-260 for information on the physical, electrical, and environmental considerations for the system unit and external devices.

Displays

The following displays can be used with all RISC System/6000 display adapters.

IBM POWERdisplay 17

The IBM POWERdisplay 17 is a high-resolution-multisync-graphics raster-scan color display. The POWERdisplay 17 is intended for high resolution graphics applications and is available only as the standard display when ordering RISC System/6000 POWERstation Models 23T, 25T, 36T, 37T, 355, 365, and 375.

The POWERdisplay 17 supports an Analog RGB and sync on green or separate horizontal and vertical sync. The display automatically synchronizes with various screen formats and provides sharp, bright, realistic colors with minimum distortion. The anti-reflective CRT surface treatment eliminates screen reflections while optimizing image quality.

The POWERdisplay 17:

- Incorporates a power management function to reduce energy consumption and increase product life
- Meets ISO 9241 Part 3 recommendations for VDT ergonomics
- Meets Nordic MPR-II emission standards
- Meets Federal Communication Commission Class B requirements
- Has digital operator controls for power, brightness, contrast, horizontal and vertical static convergence, vertical centering, geometry, and color temperature selection.

IBM 6091 Color Display Model 19i, POWERdisplay 19

The 6091 Color Display Model 19i is a high-resolution color analog display that provides powerful graphic capabilities and outstanding image quality. The display features a built-in, tilt-and-swivel base and a high-quality antireflective screen. It complies with the new ISO 9241 Part 3 requirements for image quality, while providing a very bright display.

The 6091 Model 19i screen, which measures 19 inches diagonally, includes two formats supported by the RISC System/6000: 1280x1024 pixels at a 60-hertz noninterlaced refresh rate, and 1280x1024 pixels at a 77-hertz ISO 9241 Part 3 compliant noninterlaced refresh rate.

IBM 8508 Monochrome Display

The 8508 Monochrome Display is an analog, white-phosphor raster display measuring 19 inches diagonally. The display has 1280x1024 pixels and a 67-hertz noninterlaced analog interface.

The display includes a tilt-swivel base and a low-glare screen.

RISC System/6000 Attachment

The 8508 Monochrome Display attaches to the IBM Grayscale Graphics Display Adapter using a 1.8-m (6-ft) built-in cable with a 15-pin female Mini D Connector.

Other Supported IBM Displays

The IBM 5081 Model 19, no longer available through IBM, is supported. The display requires Request for Price Quotation (RPQ) number 8K1680 to attach to a RISC System/6000 system unit.

The IBM 6091 Model 19 is no longer available through IBM, but it is supported on the RISC System/6000.

The POWER GXT100 or POWER GXT150 adapters allow connection of various IBM PS/2 displays to the 7011 Model 250. These displays include:

- 6314
- 6319
- 6317
- 6324
- 6325
- 7324
- 8517
- 9524
- 9525

Connection for Non-IBM Displays

The following displays can be connected to the POWER GXT100 or POWER GXT150 adapters using the cable feature codes shown.

Display	Cable Feature Code
Goldstar VGA1465, Hyundai SVGA, NEC 3FGx, Panasonic C1395	4213
IDEK MF5117, Mitsubishi HL6915, Mitsubishi HL/FL6615, Nanao 9070U, NEC 4D, NEC 5D, NEC 5FG/6FG, SONY GDM1953, SONY GDM1954, SONY 1605, SONY GDM1606	4214
SUN	4227

ASCII Terminals

The following ASCII terminals can be used with all RISC System/6000 system units.

IBM 3151 ASCII Display Station

The 3151 ASCII Display Station is a system-attached, 14-inch monochrome display station used for asynchronous communications. The display station supports the EIA-232D (CCITT V.24/28) interface or the EIA-422A (CCITT V.11) interface.

The 3151 display station provides 3151 native mode, 3101 mode, and various emulation modes, which are used to attach to a variety of host processors.

The display station supports transmission speeds from 50 to 38.4 Kbps on EIA-232D and EIA-422A interfaces. The data stream is ISO 646 (ANSI X3.4).

When using the EIA-232D (CCITT V.24/V.28) interface, the 3151 can attach directly to a host processor within 61 m (200 ft) at 50 to 19,200 bps, or can communicate directly or remotely to a host processor using a modem.

Supported Models

- Model 11
 - Green phosphor
 - 84-key ASCII-style keyboard
 - EIA-232D interface
 - Screen sizes: 24 by 80, 25 by 80
 - Unidirectional auxiliary port
 - 12 redefinable function keys
 - Machine modes: 3151 and 10 ASCII emulations.
- Model 31/41
 - Green phosphor (31)
 - Amber-gold phosphor (41)
 - 102-key ASCII-style keyboard
 - EIA-232D interface
 - Screen sizes: 24 by 80, 25 by 80, 24 by 132, 25x132
 - Bidirectional auxiliary port
 - 36 redefinable function keys
 - Cartridge support
 - Machine modes: 3151, 3101, and 10 ASCII emulations.
- Model 51/61
 - Green phosphor (51)
 - Amber-gold phosphor (61)
 - 101-key PS/2-style keyboard
 - EIA-232D or EIA-422A interface
 - Screen sizes: 24 by 80, 25 by 80, 24 by 132, 25x132
 - Bidirectional auxiliary port
 - Cartridge support (RPQ 8J0151 only)
 - Machine modes: 3151, 3151PC, 3151PCII and 925PC ASCII emulations.

Supported Cartridges

- IBM and DEC emulation
 - EIA-232D/422A interface
 - Machine modes: IBM, DEC, and 10 emulations.
- WYSE 50/50+

- EIA-232D interface
- Machine modes: WYSE 50/50+, 3151, and 3101.
- Connectivity
 - EIA-232D/422A interface
 - Machine modes: IBM and DEC
 - Dual session.
- Multiuser Enhancement (RPQ 8J0151)
 - EIA-232D/422A interface
 - Machine mode: 3151
 - 36 redefinable function keys
 - 17 redefinable outboard keys
 - Character sets: 00437, 00850, ISO 8859/1.2.
- Expansion
 - EIA-232D/422A Interface
 - Machine modes: 3151, 3101
 - 96 host-definable characters
 - Four pages of memory
 - Screen sizes: 24 by 80, 25 by 80, 24 by 132, 25 by 132, 28 by 80, 28 by 132
 - Double high/double wide characters
 - Independent passthrough printing.
- Data General/TeleVideo/Zentec
 - EIA-232D/422A Interface
 - Machine modes: D215, TVI950/955, ADM 11+/12+.

Cartridge	Feature Code	Part Number
IBM and DEC	8235	81X4457
WYSE 50/50+	8505	94X1958
Connectivity	8525	94X5345
Multiuser Enhancement	N/A	95F6449
Expansion	8535	81X5529
Data General, TeleVideo, Zentec	8545	94X1987

RISC System/6000 Attachment

The 3151 attaches to the system unit standard serial port using an IBM Async Cable-EIA-232/V.24 with a Printer/Terminal Interposer-EIA-232, or to an 8-, 16-, or 128-port asynchronous adapter port using a Terminal Cable-EIA-422A or an Async Cable-EIA-232/V.24 with a Printer/Terminal Interposer-EIA-232.

IBM 3164 ASCII Color Display Station

The 3164 ASCII Color Display Station is a system-attached, 14-inch, 80-column color display station used for displaying up to 1,920 characters and for entering data into and retrieving data from a host processor.

The 3164 provides an asynchronous communication interface with a 7-bit or 8-bit word length, using the EIA-232D (CCITT V.24/V.28) interface and the EIA-422A (CCITT V.11) interface. The 3164 provides the advanced editing functions of the IBM 3163 and is upwardly compatible from the IBM 3161 or 3163 native modes.

When using the EIA-232D (CCITT V.24/V.28) interface, the 3164 can directly attach to a host processor within 61 m (200 ft) at 50 to 19,200 bps, or can communicate point-to-point to a remote host processor through an external modem.

The 3164 Models 12X/22X can communicate to the host processor, without a modem, up to 1,219 m (4,000 ft) at 50 to 19,200 bps, depending on the type of cable used when using the EIA-422A (CCITT V.11) interface. For EIA-422A, a shielded communication cable is recommended.

The display stations feature the following:

- 24 lines of data display, 80 characters per line
- Up to eight color attributes in both the foreground and background
- Split screen capability (viewports, paging, partitioning)
- Redefinable keyboard layout and customer-replaceable keytops.

RISC System/6000 Attachment

The 3164 attaches to the system-unit standard serial port using an IBM Async Cable-EIA-232/V.24 with a Printer/Terminal Interposer-EIA-232, or to an 8-, 16-, or 128-port asynchronous adapter port using a Terminal Cable-EIA-422A or an Async Cable-EIA-232/V.24 with a Printer/Terminal Interposer-EIA-232.

Other Supported IBM ASCII Terminals

- IBM 3161 ASCII Display Station (no longer available through IBM)
- IBM 3163 ASCII Display Station (no longer available through IBM).

Support for Non-IBM ASCII Terminals

The following meet competitive and non-IBM coexistence requirements:

- WYSE 30, 50, 60 terminals (ANSI X3.64 terminals that use EIA-232D or EIA-422A interfaces)
- DEC VT 100, 240, 320, 330 terminals (ANSI X3.64 terminals that use EIA-232D/422A interfaces).

National Language Support

For the IBM 3151, national language support of ISO 8859/1.2 is provided in the following cartridges:

- Standard 3151 cartridge
- Multiuser enhancement cartridge
- IBM and DEC emulation cartridge
- Expansion cartridge.

For the IBM 316x terminals, ISO 8859/1.2 is available in the standard 3164 national language support (NLS) cartridge.

For Japanese language support, the PS/55 with DEC VT100 interface can be used as an ASCII terminal. The PS/55 requires both of the following:

- Nihongo DOS version K3.3 and up
- Nihongo Procomm 5600-JCK or 5605-JCK.

Keyboards

The following keyboards can be used with all RISC System/6000 system units except the 7015 POWERservers.

A keyboard is optional on all regular system units with machine types 7011, 7012, and 7013. There are some special packages which are exceptions.

The RISC System/6000 system supports only RISC System/6000 keyboards. See page 1-301 for part numbers and feature codes of supported keyboards.

IBM Keyboard–101 Keys

A 101-key keyboard with U.S. English characters is available in the United States.

The keyboard features a speaker and double-rate typematic default speed for the cursor keys.

RISC System/6000 Attachment

The 101-key keyboard connects to the RISC System/6000 keyboard port using a 2.75-m (9-ft) detachable cable with a 6-pin MINI-DIN connector.

IBM Keyboard–102 Keys

A 102-key keyboard is optional on all models. The keyboard features a speaker and double-rate typematic default speed for the cursor keys.

The RISC System/6000 system units support keyboard engravings for the following languages:

- Belgian-Dutch/French
- Canadian-French
- Danish
- Dutch (Netherlands)
- Finnish/Swedish
- French
- German
- Greek
- Icelandic
- Italian
- Korean
- Norwegian
- Portuguese
- Spanish
- Swiss-French/German
- Taiwanese
- Turkish (ID179)
- Turkish (ID440)
- U.K. English.

RISC System/6000 Attachment

The 102-key keyboard connects to the RISC System/6000 keyboard port using a 2.75-m (9-ft.) detachable cable with a 6-pin MINI-DIN connector.

IBM Keyboard—106 Keys

The 106-key keyboard is an optional keyboard. The keyboard features a speaker and double-rate typematic default speed for the cursor keys.

This keyboard is supported for the following countries:

- Japan
- Korea
- Taiwan.

The Japanese version of the keyboard can toggle among the following:

- Japanese (English)
- Japanese (Katakana)
- Japanese (Hiragana).

RISC System/6000 Attachment

The 106-key keyboard connects to the RISC System/6000 keyboard port using a 2.75-m (9-ft) cable with a 6-pin MINI-DIN connector.

Pointing and Locator Devices

IBM Three-Button Mouse

The mechanical three-button mouse allows users to point to and select items on a display. The cover on the mouse snaps off for routine cleaning of the roller ball.

RISC System/6000 Attachment

The mouse connects to the system unit mouse port using a 2.75-m (9-ft) detachable cable with a 6-pin MINI-DIN connector. The mouse adapter is built into the RISC System/6000 system unit except for the MT 7015 POWERservers.

Tablets, Dials, Lighted Programmable Function Keyboard, and Spaceball

The following tablets, dials, and keyboards can be used with all RISC System/6000 system units, except the 7015 POWERservers.

Note: When a 6094 Model 10, Model 20, or Model 30 is attached to a standard serial port, the second standard serial port can only be used for attachment of a 6094 Model 10, Model 20 or a Model 30.

IBM 6093 Model 11 CursorPad Tablet and Model 12 Tablet

The 6093 is a flat-surfaced device that enables the user to interact with a displayed image by moving a cursor or a stylus on the tablet's active surface. The 6093 Tablet is designed to be an easy-to-use input device for graphics applications. The 6093 Tablet has a palm rest and built-in legs for height adjustment. When the legs are deployed, the work surface is at a 6° angle to the table top; when not deployed, the surface is flat.

The 6093 models have the following active surface areas:

Model	Active Surface Area
Model 11	156 by 156 mm (6.1 by 6.1 in.)
Model 12	292 by 292 mm (11.5 by 11.5 in.).

The 6093 Tablet features the following:

- Programmable resolution of up to 1279 lines per inch
- Programmable buttons, which allow the user to customize usage and functions
- Support for either a four- or six-button cursor or a stylus. (The cursors and stylus cannot be used concurrently.)
- A full-sheet menu-holder overlay.

The RISC System/6000 system also supports the IBM 5083 Model 21 CursorPad Tablet and Model 22 Tablet, which are no longer available through IBM.

Hardware Requirements

The 6093 Tablet requires either a cursor or a stylus as an input device. The following input devices are available:

Four- or Six-Button Cursor

A device with four or six buttons for application use and a fine cross-hair for precise alignment and accurate digitization. The six-button cursor is mouse-shaped.

Stylus

A pen-like device with a tip switch and one function button on the side.

RISC System/6000 Attachment

The tablet attaches to the RISC System/6000 system unit using the standard tablet port. The tablet comes with a 2.1-m (7-ft) detachable cable with an 8-pin MINI DIN connector on the system end and an 8-pin rectangular connector on the tablet end.

IBM 6094 Model 10 Dials

The 6094 Model 10 is a compact, desktop unit with eight cone-shaped controls that allow the user to dynamically pan, zoom, and rotate two- and three-dimensionally displayed images. Manipulation of the dials becomes scalar input to the application program running on the attached host.

RISC System/6000 Attachment

The 6094 Model 10 attaches to the RISC System/6000 IBM Graphics Input Device Adapter using a 2.1-m (7-ft) cable with an 8-pin MINI-DIN connector. The device can also be attached to the system unit through either of the two standard EIA-232D serial ports. Either the 6091 Display provides the power or a separate power supply is used.

Note: When a 6094 Model 10, Model 20, or Model 30 is attached to a standard serial port, the second standard serial port can only be used for attachment of a 6094 Model 10, Model 20 or a Model 30.

IBM 6094 Model 20 Lighted Programmable Function Keyboard

The 6094 Lighted Programmable Function Keyboard Model 20 is a 32-key desktop unit that provides interactive capability with graphics objects. The keys are controlled by the application and the functions the keys control are defined by the user.

RISC System/6000 Attachment

The 6094 Lighted Programmable Function Keyboard Model 20 attaches to the RISC System/6000 IBM Graphics Input Device Adapter using a 2.1-m (7-ft) cable with an 8-pin MINI-DIN connector. The device can also be attached to the system unit through either of the two standard EIA-232D serial ports. Either the 6091 Display provides the power or a separate power supply is used.

Note: When a 6094 Model 10, Model 20, or Model 30 is attached to a standard serial port, the second standard serial port can only be used for attachment of a 6094 Model 10, Model 20 or a Model 30.

IBM 6094 Model 030 Spaceball

The IBM 6094 Spaceball Model 030 three-dimensional (3-D) input device puts complete, intuitive 3-D manipulation in the end-user's hands. It eliminates awkward commands and interruptive steps that tend to slow productivity and halt the creative process. The user is able to view a computer-generated model from any angle using natural fingertip pressure on the IBM Spaceball.

RISC System/6000 Attachment

The IBM 6094 Spaceball Model 030 is attached to the RISC System/6000 workstation via the S1 or S2 serial port using the Serial Port Attachment Cable that is included in the Spaceball order. The cable plugs directly into the S1 or S2 port on RISC System/6000 models that have a 25-pin connector for the serial ports; otherwise, an adapter is required. An appropriate power supply is required. IBM 5081 or 6091 displays have an appropriate power supply when available. If not, a power supply will need to be ordered.

Note: When a 6094 Model 10, Model 20, or Model 30 is attached to a standard serial port, the second standard serial port can only be used for attachment of a 6094 Model 10, Model 20 or a Model 30.

Digitizers

The following digitizers can be used with all RISC System/6000 system units, except the 7015 POWERservers.

IBM 5084 Digitizer, Models 1, 2, and 3

The 5084 Digitizer provides large-scale digitizing capabilities. The three 5084 models have the following active surface areas:

Model	Active Surface Area
Model 1	610 by 915 mm (24 by 36 in.)
Model 2	915 by 1220 mm (36 by 48 in.)
Model 3	1120 by 1525 mm (44 by 60 in.).

The 5084 Digitizer features the following:

- Resolution of up to 1279 lines per inch
- Programmable command set
- Support for both binary and ASCII output data formats
- Support for use with the IBM 5083 Tablet
- Cursor with 16 buttons and 4 indicator lights
- Two programmable audible tones
- Power supply/line cords.

The Asynchronous Communications Device Driver, part of the IBM AIX Version 3 for RISC System/6000 licensed program, supports programming to the 5084 Digitizer.

RISC System/6000 Attachment

The 5084 Digitizer attaches to the RISC System/6000 system unit using any EIA-232D port connection. The digitizer uses a 3.7-m (12-ft) EIA-232 interface cable with a 25-pin connector for attachment.

Printers

The following printers can be used with all RISC System/6000 system units.

IBM printers using either a parallel or serial EIA-232D interface can be shared in a Token-Ring or Ethernet local area network (LAN) through the use of the IBM 4033 LAN Connection for Printers and Plotters. See page 1-124 for details on this product.

IBM 2380 Personal Printer Series II

The 2380 Personal Printer Series II is a narrow-carriage, 9-wire impact printer featuring the following:

- Data streams: IBM Personal Printer Data Stream (PPDS) and Epson FX-850/FX-1050 emulation
- 320/270/90 cps (FastDraft/Draft/Near-Letter Quality)
- Paper handling: up to six-part multipart forms, paper parking, push or pull paper feed, and optional automatic sheet feeder
- An 8-inch print line
- Resident pitches: 10, 12, 15, 17.1, and 20 cpi, and proportional spacing.

RISC System/6000 Attachment

The 2380 Series II attaches to the RISC System/6000 system unit using the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the printer's serial interface option installed, IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- IBM Terminal Cable-EIA-422A to an IBM 8- or 16-port EIA-422A adapter port.

See page 1-217 for more information on the cables mentioned.

IBM 2381 Personal Printer Series II

The 2381 Personal Printer Series II is a wide-carriage, 9-wire impact printer featuring the following:

- Data streams: IBM Personal Printer Data Stream (PPDS) and Epson FX-850/FX-1050 emulation
- 320/270/90 cps (FastDraft/Draft/Near-Letter Quality)
- Paper handling: up to six-part multipart forms, paper parking, push or pull paper feed, and optional automatic sheet feeder
- A 13.6-inch print line
- Resident pitches: 10, 12, 15, 17.1, and 20 cpi, and proportional spacing.

RISC System/6000 Attachment

The 2381 Series II attaches to the RISC System/6000 system unit using the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the printer's serial interface option installed, IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- IBM Terminal Cable-EIA-422A to an IBM 8- or 16-port EIA-422A adapter port.

See page 1-217 for more information on the cables mentioned.

IBM 2390 Personal Printer Series II

The 2390 Personal Printer Series II is a narrow-carriage, letter-quality printer featuring the following:

- Data streams: IBM Personal Printer Data Stream (PPDS) and Epson LQ-850/LQ-1050 emulation
- 200/180/60 cps (FastDraft/Draft/Letter Quality)
- Paper handling: up to four-part multipart forms, paper parking, push or pull paper feed, and optional automatic sheet feeder
- An 8-inch print line
- Resident pitches: 10, 12, 15, 17.1, 20, and 24 cpi, and proportional spacing.

RISC System/6000 Attachment

The 2390 Series II attaches to the RISC System/6000 system unit using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the printer's serial interface option installed, IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- IBM Terminal Cable-EIA-422A to an IBM 8- or 16-port EIA-422A adapter port.

See page 1-217 for more information on the cables mentioned.

IBM 2391 Personal Printer Series II

The 2391 Personal Printer Series II is a wide-carriage, letter-quality printer featuring the following:

- Data streams: IBM Personal Printer Data Stream (PPDS) and Epson LQ-850/LQ-1050 emulation
- 200/180/60 cps (FastDraft/Draft/Letter Quality)
- Paper handling: up to four-part multipart forms, paper parking, push or pull paper feed, and optional automatic sheet feeder
- 13.6-inch print line
- Resident pitches: 10, 12, 15, 17.1, 20, and 24 cpi, and proportional spacing.

RISC System/6000 Attachment

The 2391 Series II attaches to the RISC System/6000 system unit using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the printer's serial interface option installed, IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- IBM Terminal Cable-EIA-422A to an IBM 8- or 16-port EIA-422A adapter port.

See page 1-217 for more information on the cables mentioned.

IBM 3812 Model 2

The 3812 Model 2 is a nonimpact page printer that can be used for departmental letter-quality printing applications. It can print up to 12 pages per minute.

The 3812 Model 2 features the following:

- PMP and PC ASCII data streams
- 240 DPI print resolution
- Two input drawers

- 1MB of memory, usable for either printer operations or resident font storage
- Support for 62 fonts
- Language group diskettes for a variety of languages.

RISC System/6000 Attachment

The printer attaches to the RISC System/6000 system unit using an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port.

See page 1-217 for more information on the cables mentioned.

IBM 3816 Models 01S and 01D

The 3816 is a letter-quality, nonimpact printer that has both simplex (01S) and duplex (01D) models. The 3816 can print up to 24 pages per minute. It is a heavy-duty printer designed for an average use of 40,000 pages per month of letter-quality printing. The printer offers 1.5MB of memory for printer operations and resident font storage and 2MB for page map storage.

The 3816 is compatible with the IBM 5202 Model 2 Quietwriter III and features the following:

- PMP and PC ASCII data streams
- 240 DPI print resolution
- Two input drawers
- Label and card-stock printing capability
- Support for 61 fonts
- Quiet operation (53 dBA).

RISC System/6000 Attachment

The 3816 Models 01S and 01D attach to the RISC System/6000 system unit using one of the following:

- IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- Customer-provided cable to an IBM 8- or 16-Port Async Adapter Adapter - EIA-422A.

See page 1-217 for more information on the cables mentioned.

IBM 4019 LaserPrinter and LaserPrinter E

The 4019 LaserPrinter and LaserPrinter E are desktop laser printers that have a single-element, operator-replaceable print cartridge. Their speed, function, and extensive font and paper-handling features make them excellent workstation page printers. The LaserPrinter can print up to 10 pages per minute; the LaserPrinter E can print up to 5 pages per minute.

The printers feature the following:

- Data stream: IBM Personal Printer Data Stream (IBM ASCII), HP Laserjet Series II emulation, plotter emulation, and Adobe PostScript (optional). Emulation and mode switching is supported for all four data streams.
- 300 DPI print resolution.
- 512KB standard memory, expandable to 4MB.
- Two font card slots.
- Second-drawer and envelope-feed options.

The 4019 supports printing Japanese and Korean characters if appropriate locale is installed and the printer is properly configured.

RISC System/6000 Attachment

The 4019 series attaches to the RISC System/6000 system units using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the printer's serial interface adapter, an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port.

For graphic-intensive applications in a multiuser environment, connection using the IBM 4033 LAN adapter is recommended.

See page 1-217 for more information on the cables mentioned.

IBM 4029 LaserPrinter 5E, 6, 10,10L, 22, and 42

The 4029 LaserPrinters are a family of desktop laser printers that each have a single-element, operator-replaceable print cartridge. Their speed, function, and extensive font and paper-handling features make them excellent workstation page printers. The LaserPrinters 10 and 10L can print up to 10 pages per minute, the LaserPrinter 6 can print up to 6 pages per minute, and the LaserPrinter 5E can print up to 5 pages per minute. LaserPrinters 22 and 42 come with PostScript and memory options included.

The printers feature the following:

- Data stream: IBM Personal Printer Data Stream (IBM ASCII), HP Laserjet Series II emulation (PCL4), and plotter emulation. HP Laserjet Series III emulation (PCL5) and Adobe PostScript emulation are optional. Emulation and mode switching is supported for all four data streams.
- 300/600 DPI print resolution.
- 1MB standard memory, expandable to 9MB.
- Automatic paper-size sensing.
- Two font card slots (Model 5E has one card slot).
- Paper handling: envelope plus feeder, second 500-sheet drawer standard on Model 10L, optional on other models.
- Compatibility with the IBM 4033 LAN Connection for Printers and Plotters for high-speed data transfers to the printer.

RISC System/6000 Attachment

The 4029 series attaches to the RISC System/6000 system units using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the printer's serial interface adapter, an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port.

For graphic-intensive applications in a multiuser environment, connection using the IBM 4033 LAN adapter is recommended.

See page 1-217 for more information on the cables mentioned.

IBM 4039 LaserPrinter 10R, 10D, 12L, 12R, and 16L

The IBM 4039 LaserPrinters offer Print Quality Enhancement Technology for extremely sharp text and graphics and can print on a variety of paper types and sizes as well as on transparencies and labels.

The printers feature the following:

- HP LaserJet Series III emulation (PCL5)
- PostScript Level 1 interpreter standard with 39 Type-1 outline fonts

- High-resolution, 600x600 DPI printing
- Duplex capability that may be added as necessary
- Standard 4MB RAM memory, expandable to 16MB on models 12R, 12L, and 16L. Models 10R and 10D come with 2MB RAM memory standard and are expandable to 16MB.
- Integrated network adapters for Ethernet, and Token-Ring.

RISC System/6000 Attachment

The 4039 series attaches to the RISC System/6000 system units using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the printer's serial interface adapter, an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port.

For graphic-intensive applications in a multiuser environment, connection using the IBM 4033 LAN adapter is recommended.

See page 1-217 for more information on the cables mentioned.

IBM Color Jetprinter PS 4079

The IBM Color Jetprinter PS 4079 is a wide-format (B-size), high-quality, ink-jet printer designed to offer versatile paper handling and consistent high-quality printing. The printer, which is well-suited to high-resolution color graphics, features up to 360 DPI print resolution. The printer has color plotter and color PostScript emulation modes.

The printer features the following:

- Data stream: Color Postscript emulation (level 1) and Color Plotter emulation. Automatic mode switching is supported between the two emulation modes.
- 360 DPI print resolution.
- 4MB standard memory, expandable to 16MB.
- Paper sizes up to 11x17 inches (A3)
- Parallel, Fastbytes parallel, and serial (EIA-232D) interfaces are standard
- Compatibility with the IBM 4033 LAN Connection for Printers and Plotters for high-speed data transfers to the printer.

RISC System/6000 Attachment

The 4079 printer attaches to the RISC System/6000 system units using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the printer's serial interface adapter, an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port.

For graphic-intensive applications in a multiuser environment, connection using the IBM 4033 LAN adapter is recommended.

See page 1-217 for more information on the cables mentioned.

IBM 4070 IJ Model 1 Printer

The IBM 4070 IJ Printer is a low-cost narrow-carriage, ink-jet printer. The printer provides excellent letter-quality and graphics printing. This flexible personal printer is easy to use and uses a disposable print head/ink cartridge for excellent reliability. The printer features the following:

- Low-cost, letter-quality text and graphics up to 360 x 360 dpi
- Print speeds 83 cps in letter quality; 110 cps draft
- Parallel attachment

- Flexible paper handling with a detachable sheet feed
- Very small footprint, light weight, easily moved.

RISC System/6000 Attachment

The 4070 Printer attaches to the RISC System/6000 system unit using an IBM PC Parallel Printer Cable to the standard parallel port.

IBM 4072 ExecJet Printer

The IBM 4072 ExecJet printer is a wide-carriage letter-quality ink-jet printer designed to offer low-cost ownership, versatile paper handling, and consistent high-quality printing. The printer, which is well-suited for high-resolution graphics, features up to 360 DPI print resolution. The ExecJet emulates the IBM 4208 Proprinter XL24E, the IBM 5202 Quietwriter III, and the Epson LQ-1050.

The printer has the following options:

- Three font cards
- 128KB download memory card
- Optional serial interface module (EIA-232D or EIA-422A)
- Automatic-sheet-feed second bin.

RISC System/6000 Attachment

The 4072 attaches to the RISC System/6000 system unit using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the Serial Interface option installed, an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- IBM Terminal Cable-EIA-422A to an IBM 8- or 16-Port Async Adapter-EIA-422A port

See page 1-217 for more information on the cables mentioned.

IBM 4201 Model 2 Proprinter II

The 4201 Model 2 Proprinter II provides high-speed narrow-carriage, desktop-printer operation.

The printer features the following:

- PC ASCII data stream
- 240/200/50 cps (Fast Font/Draft/Near-Letter Quality)
- Parallel interface standard, or optional serial EIA-232D interface
- 256-character downloadable font capability
- 8-inch print line.

RISC System/6000 Attachment

The 4201 Model 2 attaches to the RISC System/6000 system unit using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the serial-interface option installed, an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port, or to an IBM 8-, 16-, or 128-port EIA-232D adapter port.

See page 1-217 for more information on the cables mentioned.

IBM 4201 Model 3 Proprinter III

The 4201 Model 3 Proprinter III provides low-cost dot-matrix-printer operation.

The printer features the following:

- PC ASCII data stream
- 320/270/65 cps (Fast Font/Draft/Near-Letter Quality)
- Parallel interface standard or optional serial interface (EIA-232D or EIA-422A)
- 7KB print buffer expandable to 32KB
- IBM Multilingual Character Set (Code Page 850) resident
- Single-bin sheet feed option
- An 8-inch print line.

RISC System/6000 Attachment

The 4201 Model 3 Proprinter III attaches to the RISC System/6000 system unit using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the serial-interface option installed, an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port, or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- IBM Terminal Cable-EIA-422A to an IBM 8- or 16-Port Async Adapter-EIA-422A port.

See page 1-217 for more information on the cables mentioned.

IBM 4202 Model 2 Proprinter XL

The 4202 Model 2 Proprinter XL provides high-speed wide-carriage, desktop-printer operation.

The printer features the following:

- PC ASCII data stream
- 240/200/50 cps (Fast Font/Draft/Near-Letter Quality)
- Parallel interface standard, or optional serial EIA-232D interface
- 256-character downloadable font capability
- A 13.6-inch print line.

RISC System/6000 Attachment

The 4202 Model 2 attaches to the RISC System/6000 system unit using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the serial-interface option installed, an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port.

See page 1-217 for more information on the cables mentioned.

IBM 4202 Model 3 Proprinter XL

The 4202 Model 3 Proprinter XL provides high-speed wide-carriage, desktop-printer operation.

The printer features the following:

- PC ASCII data stream
- 320/270/65 cps (Fast Font/Draft/Near-Letter Quality)
- Parallel interface standard, or optional serial interface (EIA-232D or EIA-422A)
- 7KB print buffer expandable to 32KB
- IBM Multilingual Character Set (Code Page 850) resident
- Single-bin sheet feed option
- An 8-inch print line.

RISC System/6000 Attachment

The 4202 Model 3 Proprinter XL attaches to the RISC System/6000 system unit using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the Serial Interface option installed, an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- IBM Terminal Cable-EIA-422A to an IBM 8- or 16-Port Async Adapter-EIA-422A port.

See page 1-217 for more information on the cables mentioned.

IBM 4207 Proprinter X24E Model 2

The 4207 Proprinter X24E Model 2 is a high-speed letter-quality printer.

The printer features the following:

- PC ASCII data stream
- 240/80 cps (Data Processing/Letter Quality)
- Parallel interface standard, or optional serial interface (EIA-232D or EIA-422A)
- 14KB print buffer
- Optional automatic sheet-feed.

RISC System/6000 Attachment

The 4207 attaches to the RISC System/6000 system unit using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the serial-interface option installed, an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- IBM Terminal Cable-EIA-422A to an IBM 8- or 16-Port Async Adapter-EIA-422A port.

See page 1-217 for more information on the cables mentioned.

IBM 4208 Proprinter XL24E Model 2

The 4208 Proprinter XL24E Model 2 is a high-speed wide-carriage, letter-quality printer.

The printer features the following:

- PC ASCII data stream
- 240/80 cps (Data Processing/Letter Quality)
- Parallel interface standard, or optional serial interface (EIA-232D or EIA-422A)
- 14KB print buffer
- 13.6-inch print line
- Optional automatic sheet feed.

RISC System/6000 Attachment

The 4208 Model 2 attaches to the RISC System/6000 system unit using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the serial-interface option installed, an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- IBM Terminal Cable-EIA-422A to an IBM 8- or 16-Port Async Adapter-EIA-422A port.

See page 1-217 for more information on the cables mentioned.

IBM 4208 Model 502

The IBM 4208 Model 502 is a Japanese language 24-dot impact printer that features the following:

- Resolution of 180 pels
- Data stream: Kanji (DBCS) in Japanese mode, Proprinter Data Stream (SBCS) in Proprinter Emulation mode.

The 4208 Model 502, in Normal Speed Mode, has a print speed of 53 cps for Kanji characters and 80 cps for AlphaNumeric-Katakana characters. In High Speed Mode, it has a print speed of 106 cps for Kanji characters and 160 cps for AlphaNumeric-Katakana characters.

RISC System/6000 Attachment

The 4208 Model 502 attaches to the RISC System/6000 standard parallel port using either of two Japanese printer cables.

See page 1-217 for more information on the cables mentioned.

IBM 4212 Proprinter 24P Model 1

The IBM Proprinter 24P is a low-cost narrow-carriage, 24-wire, serial-dot-matrix impact printer. The IBM Proprinter 24P provides excellent letter-quality printing and bidirectional alignment, in addition to high-resolution graphics printing.

The printer features the following:

- Low-cost letter-quality printing capability
- Print speeds up to 160 cps at 10 cpi, and up to 192 cps at 12 cpi
- Adjustable flat-belt tractors, which provide versatile and reliable paper handling
- New user-friendly operator panel
- Parallel attachment.

The RISC System/6000 system supports the IBM Proprinter 24P as a parallel-attached IBM 4207 Model 2 Proprinter X24E.

RISC System/6000 Attachment

The 4212 attaches to the RISC System/6000 system unit using an IBM PC Parallel Printer Cable to the standard parallel port.

See page 1-217 for more information on the cables mentioned.

IBM 4216 Model 31 Personal Page Printer

The 4216 Model 31 is a compact desktop PostScript page printer capable of printing up to 6 pages per minute using a laser/electrophotographic (EP) process. It contains an internal controller for printing PostScript documents.

The printer features the following:

- 300 DPI print resolution
- Very quiet (52 dBA printing, 48 dBA idling) operation
- 2MB memory
- HP Laserjet Plus emulation
- 43 resident PostScript typefaces.

RISC System/6000 Attachment

The 4216 Model 31 attaches to the RISC System/6000 system unit using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port.

See page 1-217 for more information on the cables mentioned.

IBM 4216 Model 510

The IBM 4216 Model 510 is a Japanese language laser page printer that can print up to 6 pages per minute. The printer features the following:

- Resolution of 240 pels
- Data stream: Kanji (DBCS) in Japanese mode.

RISC System/6000 Attachment

The 4216 Model 510 attaches to the RISC System/6000 standard parallel port using a Japanese printer cable (part number 56F-7854). Due to the length of this cable, the 4216 Model 510 cannot be used with the 7015 POWERserver.

See page 1-217 for more information on the cables mentioned.

IBM 4224 Models 301, 302, 3C2, and 3E3

The 4224 Models 301, 302, 3C2, and 3E3 are heavy-duty serial dot-matrix impact printers. They are ideal desktop printers for various data-processing and word-processing applications in a multiuser environment. The Model 301 has a draft print speed of 200 cps, Models 302 and 3C2 have a draft print speed of 400 cps, and the Model 3E3 has a draft print speed of 600 cps.

All the printers feature the following:

- PC ASCII data stream
- 512KB print buffer
- OCR and barcode printing capability
- Multifunction operator panel
- Operator-replaceable printhead.

In addition, the Model 3C2 supports color printing.

RISC System/6000 Attachment

The 4226 Model 302 attaches to the RISC System/6000 system unit using one of the following:

- IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- IBM Terminal Cable-EIA-422A to an IBM 8- or 16-Port Async Adapter-EIA-422A port.

See page 1-217 for more information on the cables mentioned.

IBM 4226 Model 302

The 4226 Model 302 is a heavy-duty, unattended, serial dot-matrix impact printer. The Model 302 features the following:

- Print speeds up to 533 cps for FastDraft, 400 cps for Draft, and 100 cps for Near-Letter Quality
- Data streams: IBM Personal Printer Data Stream (PPDS) and Epson FX/DFX emulation
- Support for up to six-part multipart forms
- Resident pitches: 10, 12, 15, 17.1, and 20 cpi, and proportional spacing.

RISC System/6000 Attachment

The 4226 Model 302 attaches to the RISC System/6000 system unit using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- Using the printer's built-in serial-interface adapter, IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- Customer-supplied cable to an IBM 8- or 16-port EIA-422A adapter port.

See page 1-217 for more information on the cables mentioned.

IBM 4234 Model 9 and Model 13

The 4234 is a dot-band line-matrix impact printer that is designed for heavy-duty, line dot-matrix printing applications in a shared environment.

The 4234 Model 9 and Model 13 feature the following:

- PC ASCII data stream
- 475/350/160 LPM (Draft/Data Processing/Near- Letter Quality) for Model 9
- 800/600/200 LPM (Draft/Data Processing/Near- Letter Quality) for Model 13
- Low noise
- Power-assisted forms loading
- Horizontal and Vernier forms adjustment
- Operator-replaceable dot band.

RISC System/6000 Attachment

The 4234 attaches to the RISC System/6000 system unit using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port or an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- IBM Terminal Cable-EIA-422A to an IBM 8- or 16-Port Async Adapter-EIA-422A port.

See page 1-217 for more information on the cables mentioned.

IBM 5202 Quietwriter III

The Quietwriter III Printer is a high-speed executive letter-quality, nonimpact printer designed to print All-Points-Addressable (APA) graphics.

The printer features the following:

- PC ASCII data stream
- 160/100/80 cps (Draft/Letter Quality/ Enhanced Letter Quality)
- Low noise
- Transparency printing capability.

The printer has the following options:

- Single- and dual-drawer sheet feeds
- Pin wheel tractor
- Font cartridges.

RISC System/6000 Attachment

The Quietwriter III Printer attaches to the RISC System/6000 system unit using an IBM PC Parallel Printer Cable to the standard parallel port.

See page 1-217 for more information on the cable mentioned.

IBM 5204 Quickwriter Model 1

The 5204 Model 1 is a letter-quality matrix impact printer that is designed for heavy-duty, letter-quality printing applications.

The 5204 Model 1 features the following:

- PC ASCII data stream
- 330/110 cps (Draft/Letter Quality)
- Eight resident fonts.

The printer has the following options:

- Dual automatic sheet feed, plus envelope feeder
- Pin wheel tractor
- 55 cps with optional Selectric font
- Font cartridges, with up to 12 fonts online.

RISC System/6000 Attachment

The 5204 Model 1 attaches to the RISC System/6000 system unit using one of the following:

- IBM PC Parallel Printer Cable to the standard parallel port
- With the printer's serial interface adapter, an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port.

See page 1-217 for more information on the cables mentioned.

IBM 6252 Impactwriter Models AP2, AS2, AP8 and AS8

The IBM 6252 Impactwriter AS8 and AP8 are fully formed engraved band printers rated at up to 800 lines per minute with a 48-character set printband. The IBM 6252 Impactwriter AP2 and AS2 are fully formed engraved band printers rated at up to 1200 lines per minute with a 48-character set print band. The 6252 is not an all-points-addressable (APA) printer. Various fonts are available, including Courier, Wide Courier, text, Optical Character Recognition (OCR) A & B, American Library Association (ALA), multinational, and A Programming Language (APL).

The printers feature the following:

- Optional bar code printing capability
- 80-character LCD display that shows printer condition using chosen language rather than codes
- Very low noise level.

RISC System/6000 Attachment

The 6252 Impactwriter AP8 attaches to the RISC System/6000 system unit using an IBM PC Parallel Printer Cable to the standard parallel port.

The AS8 attaches to the RISC System/6000 system unit using one of the following:

- IBM Async Cable-EIA-232/V.24 (with Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- IBM Terminal Cable-EIA-422A to an IBM 8- or 16-port EIA-422A adapter port.

See page 1-217 for more information on the cables mentioned.

IBM 6262 Impactwriter Models A12, A14, and A22

The IBM 6262 line printers are fully formed engraved band printers rated at up to 2200 lines per minute with a 48-character set printband. The 6262 is not an All-Points-Addressable (APA) printer. Various fonts are available, including Courier, Wide Courier, text, Optical

Character Recognition (OCR) A & B, American Library Association (ALA), multinational, and A Programming Language (APL).

The printers feature the following:

- 1200/1400/2200 LPM (A12, A14, and A22, respectively)
- IBM 4202 Model 3 emulation
- Optional bar code printing capability
- 80-character LCD display that shows printer condition using chosen language rather than codes
- Very low noise level.

RISC System/6000 Attachment

The 6262 printers attach to the RISC System/6000-system-unit using either a standard serial port or the standard parallel port.

The printers attach to the RISC System/6000-system-unit parallel port using an IBM PC Parallel Printer Cable.

The printers attach to a RISC System/6000-system-unit serial port using one of the following:

- IBM Async Cable-EIA-232/V.24 (with Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port
- IBM Terminal Cable-EIA-422A to an IBM 8- or 16-port EIA-422A adapter port.

See page 1-217 for more information on the cables mentioned.

IBM 5327 Model 11

The 5327 Model 11 is a Japanese language, floor-standing, line dot-matrix printer designed for heavy-duty office use. The 5327 features the following:

- Resolution of 180 pels
- 70-meter (230-ft) black ribbon cassette.

The printer has a print speed of 330 lines per minute in Normal-Speed Mode and 400 lines per minute in High-Speed Mode.

RISC System/6000 Attachment

The printer attaches to the RISC System/6000 standard parallel port using either of two Japanese printer cables.

See page 1-217 for more information on the cables mentioned.

IBM 5572 Model B02

The IBM 5572 Model B02 is a Japanese language 24-dot impact printer that features the following:

- Resolution of 180 pels
- Data stream: Kanji (DBCS) in Japanese Mode, Proprinter Data Stream (SBCS) in Proprinter Emulation Mode.

The 5572 Model B02, in Normal-Speed Mode, has a print speed of 33 cps for Kanji characters and 50 cps for AlphaNumeric-Katakana characters. In High-Speed Mode, it has a print speed of 66 cps for Kanji characters and 100 cps for AlphaNumeric-Katakana characters.

RISC System/6000 Attachment

The 5572 Model B02 attaches to the RISC System/6000 standard parallel port using either of two Japanese printer cables.

See page 1-217 for more information on the cables mentioned.

IBM 5575 Models B02, F02, and H02

The 5575 Models B02, F02, and H02 are Japanese, Korean, and Traditional Chinese language 24-dot impact printers designed for light-duty office use. The 5575 Models feature the following:

- Resolution of 180 pels
- Automatic-sheet-feed option.

The B02, in Normal-Speed Mode, has a print speed of 60 cps for Kanji, Korean, and Traditional Chinese characters, and 90 cps for AlphaNumeric-Katakana characters. In High-Speed Mode, it has a print speed of 120 cps for Kanji, Korean, and Traditional Chinese characters, and 180 cps for AlphaNumeric-Katakana characters.

The F02 and H02, in Normal-Speed Mode, have a print speed of 75 cps for Kanji, Korean, and Traditional Chinese characters and 113 cps for AlphaNumeric-Katakana characters. In High-Speed Mode, they have a print speed of 150 cps for Kanji, Korean and Traditional Chinese characters and 225 cps for AlphaNumeric-Katakana characters.

RISC System/6000 Attachment

The 5575 Models B02, F02, and H02 attach to the RISC System/6000 standard parallel port using either of two Japanese printer cables.

See page 1-217 for more information on the cables mentioned.

IBM 5577 Models B02, F02, and G02

The 5577 Models B02, F02, and G02 are Japanese, Korean, and Traditional Chinese language 24-dot impact printers designed for heavy-duty office use. The 5577 Models feature the following:

- Resolution of 180 pels
- Automatic-sheet-feed option.

The B02, in Normal-Speed Mode, has a print speed of 70 cps for Kanji, Korean, and Traditional Chinese characters, and 105 cps for AlphaNumeric-Katakana characters. In High-Speed Mode, it has a print speed of 140 cps for Kanji, Korean, and Traditional Chinese characters, and 210 cps for AlphaNumeric-Katakana characters.

The F02 and G02, in Normal-Speed Mode, have a print speed of 90 cps for Kanji, Korean, and Traditional Chinese characters, and 135 cps for AlphaNumeric-Katakana characters. In High-Speed Mode, they have a print speed of 180 cps for Kanji, Korean, and Traditional Chinese characters, and 270 cps for AlphaNumeric-Katakana characters.

RISC System/6000 Attachment

The 5577 Models B02, F02, and G02 attach to the RISC System/6000 standard parallel port using either of two Japanese printer cables.

See page 1-217 for more information on the cables mentioned.

IBM 5587 Models G01 and H01

The 5587 Models G01 and H01 are Japanese language 240-pel laser page printers utilizing electrophotographic printing technology with a laser scanning unit.

The 5587 features the following:

- Double input paper cassette
- Font diskette.

The 5587 Models print up to 8 pages per minute.

RISC System/6000 Attachment

The 5587 Models G01 and H01 attach to the RISC System/6000 standard parallel port using either of two Japanese printer cables.

See page 1-217 for more information on the cables mentioned.

Connection for Non-IBM Printers

A variety of non-IBM printers can connect to the RISC System/600 system unit. Those printers include:

- Canon Laser Shot LBP-A304E, LBP-A404, and LBP-A404E (Kanji)
- Canon Laser Shot LBP-B4065/D (Kanji)
- Data Products LZR 2665 Laser Printer
- Data Products BP2000
- OKI Microline 801PS (Kanji)
- PRINTRONIX P9012
- QMS Colorscript 100 Model 20
- TI Omnilaser 2115 Page Printer
- HP LaserJet Series II, III, IIISi, and LaserJet 4.

AIX supports Hewlett Packard's JetDirect cards for UNIX Network Peripheral Interface. This support allows connection of HP LaserJet printers or HP DesignJet plotters to an Ethernet network.

National Language Support

The printers previously described, with the exception of the IBM 53xx and IBM 55xx Models, support the following languages:

- Danish
- Dutch
- English (U.S. and U.K.)
- Finnish/Swedish
- French
- German
- Greek
- Korean
- Icelandic
- Italian
- Norwegian
- Portuguese
- Spanish
- Swiss
- Taiwanese
- Turkish.

The 4019 supports printing Japanese and Korean characters if the appropriate locale is installed and the printer is properly configured.

Plotters

The following plotters can be used with all RISC System/6000 system units. IBM plotters using either a parallel or serial EIA-232D interface can be shared in a Token-Ring or Ethernet local area network (LAN) through the use of the IBM 4033 LAN Connection for Printers and Plotters. See page 1-124 for details on this adapter.

IBM 6180 Color Plotter Model 1

The 6180 Color Plotter is an 8-pen high-resolution vector desktop plotter capable of producing quality graphics on paper or transparency film with highly accurate registration and repeatability. The IBM Graphics Enhancement Cartridge, which provides IBM 7372 compatibility and greatly increases the number of commands and character sets, is an option.

The plotter features the following:

- Support for two pen types:
 - Fiber-tip pen for paper
 - Fiber-tip pen for transparency film.
- Support for two media types:
 - Paper
 - Transparency film.
- 8-pen carousel that allows for automatic pen capping
- Excellent line quality
- Support for A and A4 drawing sizes.

RISC System/6000 Attachment

The 6180 Color Plotter Model 1 attaches to the RISC System/6000 system unit using an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port. For more information on the Async Cable-EIA-232/V.24, see page 1-217.

IBM 6182 Auto-Feed Color Plotter

The 6182 Auto-Feed Color Plotter is a high-performance, 8-pen desktop plotter with automatic sheet feed. The plotter has a maximum pen speed of 80 cm/sec (31.5 in./sec).

The plotter features the following:

- Plotting on A- or B-sized paper, transparency, vellum, or polyester film
- 1KB I/O buffer, user-configurable to 12KB
- HP-GL compatible command set.

RISC System/6000 Attachment

The 6182 Plotter attaches to the RISC System/6000 system unit using an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port. For more information on the Async Cable-EIA-232/V.24, see page 1-217.

IBM 6184 Color Plotter Model 1

The 6184 Color Plotter is an 8-pen drafting plotter that produces large-format C/A2- and D/A1-size engineering drawings.

The plotter features the following:

- Switchable pen sorting
- Support for three media types:
 - Chart papers
 - Vellum
 - Double-matte polyester film
- High line quality that provides smooth circles, consistent line widths, and crisp characters
- Support for A1, A2, C, and D drawing sizes.

RISC System/6000 Attachment

The 6184 Color Plotter Model 1 attaches to the RISC System/6000 system unit using an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port. For more information on the Async Cable-EIA-232/V.24, see page 1-217.

IBM 6185 Color Plotters Models 1 and 2

The 6185 Models 1 and 2 are high-quality 8-pen plotters that produce large-format A-through D-size or A- through E-size engineering and graphic-design drawings.

The plotters feature the following:

- Switchable pen sorting
- Pen speed of 80 cm (31.5 in.) per second
- Support for seven media types:
 - Plotter paper
 - Vellum
 - Tracing and translucent bond
 - Double-matte polyester film
 - Glossy presentation paper
 - Overhead transparency film.
- Optional 1MB and 2MB Buffer Expansion Units, which allow plotting while the workstation performs other tasks.

RISC System/6000 Attachment

The 6185 Models 1 and 2 attach to the RISC System/6000 system unit using an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port. For more information on the Async Cable-EIA-232/V.24, see page 1-217.

IBM 6187 Color Plotter Models 1 and 2

The 6187 Color Plotter is a high-performance 8-pen workstation plotter with a maximum pen speed of 60 cm/sec (24 in./sec).

The plotters feature the following:

- 8-pen color plotters for A- through E-size media: Model 1 cut-sheet, Model 2 cut-sheet and continuous roll
- 1MB buffer
- Cut sheet or continuous roll 26KB buffer

- Support for HPGL, HPGL/2, or 7375 emulation command sets
- 5 pen types and 6 media types supported
- Pen-sorting algorithm.

RISC System/6000 Attachment

The 6186 Color Plotters attach to the RISC System/6000 system unit using an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port. For more information on the Async Cable-EIA-232/V.24, see page 1-217.

IBM 7372 Color Plotter

The 7372 Color Plotter provides low-cost six-color plotter operation.

The plotter features the following:

- 6-pen color plotter for A/A4-size paper and transparency film media
- Programmable cursor buttons
- Automatic pen capping.

RISC System/6000 Attachment

The 7372 Color Plotter attaches to the RISC System/6000 system unit using an IBM Async Cable-EIA-232/V.24 (with a Printer/Terminal Interposer EIA-232) to a standard serial port or to an IBM 8-, 16-, or 128-port EIA-232D adapter port. For more information on the Async Cable-EIA-232/V.24, see page 1-217.

Other Supported IBM Plotters

While no longer available from IBM, the IBM 6186 Color Plotter, Models 1 and 2, are also supported.

Graphics Subsystems and Processors

IBM 7235 POWER GTO Models 01i and 02i Graphics Subsystem

The IBM POWERgraphics GTO is designed for applications requiring high-function, high-performance graphics. The POWERgraphics GTO uses only one Micro Channel adapter slot in the IBM RISC System/6000. Coupling an IBM RISC System/6000 POWERstation 220, 230, or 340 processor with a POWERgraphics GTO provides high-performance technical computing with high-performance, high-function graphics at a competitive price.

The POWERgraphics GTO is a three-dimensional (3D) graphics product. Special hardware and software in the POWERgraphics GTO accelerate line drawing, shading, and geometric transformations such as zooming, panning, and perspective viewing.

Applications requiring the level of function and performance that the POWERgraphics GTO offers are typically scientific and technical, including high-end mechanical CAD, molecular modeling, scientific visualization, and entertainment graphics.

The POWERgraphics GTO supports and is optimized for the international open graphics standard, PHIGS, and its IBM offering, graPHIGS. The POWERgraphics GTO also supports X-based and GL-based graphics applications.

The 8-bit POWERgraphics GTO provides 256 simultaneous colors and is characterized by dual-frame buffers, transformation and clipping, advanced graphics primitives, bit-block transfer within frame buffers, preselection highlighting, and fast buffer clear. The 8-bit-block POWERgraphics GTO is an outstanding machine for high-speed 2D/3D wire-frame applications.

The 24-bit POWERgraphics GTO provides many of the same functions of the 8-bit model and adds a Shading Processor, which supports constant and smooth color shading, opaque or transparent surface processing, hidden-line removal, and depth cueing; and a 24-bit pixel memory Frame Buffer, which supports 16.7 million direct or 256 indexed graphics machine for computer-intensive, 2D/3D solids modeling, fast polygon applications.

The 7235 POWER GTO provides high-function and high-performance 3D graphics capability for all RISC System/6000 POWERstations.

The IBM 6094 Model 010 Dials, the IBM 6094 Lighted Programmable Function Keyboard Model 20, the IBM 6094 Model 030 Spaceball, the IBM 6093 Tablet (Models 11 and 12), and the IBM 5084 Digitizer (Models 1, 2, and 3) can be used to enable interactive user input. The graphics subsystem can be used with the IBM 5081, IBM 6091 and POWERdisplays.

The IBM AIXwindows Environment/6000 provides programmers with the windowing and programming capabilities of Massachusetts Institute of Technology's popular X Window System and includes an interface to the GL and graPHIGS graphics functions.

RISC System/6000 Attachment

The subsystem comes with a 3-m (9.8-ft) power cord. The POWER GTO Accelerator Adapter is needed to attach the 7235 to the RISC System/6000 system. This adapter, which requires one Micro Channel adapter slot, must be installed in the RISC System/6000 when the 7235 is installed. For information on which system units can use this adapter, see page 1-142.

IBM 5086 Model 1

The 5086 is a graphics processor with 2MB base memory expandable to 8MB. The floor-standing unit features downloading licensed internal code from the host and window capabilities.

IBM 5086 Xterminal Feature

The 5086 Xterminal Feature brings high performance LAN attached Xterminal capability to a 5086 Graphics Processor by integrating a powerful IBM Xstation 150 into the 5086 Graphics Processor Enclosure. This feature allows the user to switch between a full-screen 5086 environment and a full-screen X Window System environment through a simple key sequence. Performance of both the 5086 Graphics Processor and the Xstation 150 are maintained.

The 5086 Feature has these capabilities:

- Complies with the International Organization of Standards (ISO) video ergonomics standard and is also backward-compatible with non-ISO-compliant displays
- Comes installed with an Xserver based on the X Window System Version 11 Release 5 in rewritable, nonvolatile flash memory.
- Offers a choice of either Token-Ring or Ethernet communications connections, in addition to the 5086 base Ethernet or coaxial connection.
- Can be ordered with a new 5086-o1i or as a field upgrade to any 5086 Graphics Processor.

RISC System/6000 Attachment

The 5086 Model 1 comes with a 5-m (16.4-ft.) coaxial cable for attachment to an IBM 5086 Attachment Adapter. A "Y" Cable is provided for attachment of the system unit to the graphics processor. For more information on the cable mentioned, see page 1-217.

Other Supported Graphics Processors

While no longer available from IBM, the IBM 5085, Models 1, 1A, 2, and 2A are also supported. To work with the RISC System/6000 system unit, the Model 1 requires the IBM 5085 Attachment Adapter, as well as modification and service assistance from IBM.

Diskette and Disk Drives

IBM 3.5-Inch Diskette Drive

A 1.44MB 3.5-inch diskette drive is standard on all RISC System/6000 system units except the Models M20, M2A, 220, 230 and 250.

Models 220, 230 and 250 have an optional 2.88MB 3.5-inch drive which can also read and write 1.44MB diskettes.

Both drives are identical to the 3.5-inch drives in the PS/2 family. Each RISC System/6000 system unit supports only one internal 3.5-inch diskette drive.

RISC System/6000 Attachment

The drive attaches to the RISC System/6000 system unit using an internal cable to the diskette controller in the system unit.

IBM 5.25-Inch Internal Diskette Drive

The 1.2MB 5.25-Inch Internal Diskette Drive provides data interchange capability between the RISC System/6000 system unit and other systems. The drive is used only in the 7015 Processor Drawer.

The 7015 POWERserver supports only one 5.25-inch internal diskette drive.

RISC System/6000 Attachment

The 5.25-Inch Internal Diskette Drive uses an internal cable to connect to the system unit diskette controller.

IBM 4869 Model 2 5.25-Inch 1.2MB External Diskette Drive

The 4869 Model 2 5.25-Inch 1.2MB External Diskette Drive provides data interchange capability between the RISC System/6000 system unit and other systems. See page 1-83 for information on which systems use this drive.

See page 1-259 for physical, electrical, and environmental considerations for the drive.

RISC System/6000 Attachment

The 4869 Model 2 5 1/4-Inch 1.2MB External Diskette Drive comes with a detachable power cord and a signal cable. The nondetachable signal cable connects to the system unit diskette controller. The cable has a 34-pin D-shell connector.

IBM 200MB SCSI-2 Disk Drive

The 200MB SCSI Disk Drive is a 3.5-inch drive that features an average seek time of 12 milliseconds. This drive is a 1/2-high 3.5-inch form factor.

See pages 1-83 and 1-85 for detailed specifications.

RISC System/6000 Attachment

The 200MB SCSI Disk Drive attaches to the RISC System/6000 system unit using an appropriate cable to an IBM SCSI controller.

IBM 355MB SCSI Disk Drive

The 355MB SCSI Disk Drive is a 5.25-inch drive that features an average seek time of 16 milliseconds and a rotational speed of 3600 rpm.

The drive is featured in the IBM 355MB Portable Disk Drive Module.

RISC System/6000 Attachment

The 355MB Portable Disk Drive Module is contained in the IBM 7203 Model 1 External Portable Disk Drive. See page 1-83 for information on the 7203.

IBM 400MB SCSI Disk Drive

The 400MB SCSI Disk Drive is a 3.5-inch drive with an average seek time of 11.5 milliseconds and a rotational speed of 4316 rpm.

See page 1-83 for information on which systems use this drive.

RISC System/6000 Attachment

The 400MB SCSI Disk Drive connects to the RISC System/6000 system unit using cable to an IBM SCSI controller.

IBM 540MB SCSI-2 Disk Drive

The 540MB SCSI Disk Drive is a 3.5-inch drive with an average seek time of 8.5 milliseconds and a rotational speed of 6300 rpm.

See page 1-83 for information on which systems use this drive.

RISC System/6000 Attachment

The 540MB SCSI Disk Drive connects to the RISC System/6000 system unit using cable to an IBM SCSI controller.

IBM 857MB SCSI Disk Drive

The 857MB SCSI Disk Drive is a 5.25-inch high-performance drive that features an average seek time of 11.2 milliseconds and a rotational speed of 4986 rpm.

See page 1-83 for information on which systems use this drive.

RISC System/6000 Attachment

The 857MB SCSI Disk Drive connects to the RISC System/6000 system unit using an appropriate cable to an IBM SCSI controller.

IBM 857MB Serial Disk Drive

The 857MB Serial-Link Disk Drive is a 5.25-inch high-performance drive that features an average seek time of 11.2 milliseconds and a rotational speed of 4986 rpm. The drive can operate in dual simplex mode, transmitting and receiving simultaneously.

The storage device can be used in the IBM 9333 Model 10 or Model 500 High-Performance Subsystem.

See page 1-83 for information on which systems use this drive through the IBM 9333.

RISC System/6000 Attachment

The 857MB Serial-Link Disk Drive connects to the RISC System/6000 system unit using an appropriate cable to an IBM 9333 High-Performance Subsystem Adapter.

IBM 1GB SCSI-2 Disk Drive

The 1GB SCSI Disk Drive is a 3.5-inch high-performance drive that features an average seek time of 9.8 milliseconds and a rotational speed of 4316 rpm.

See page 1-83 for information on which systems use this drive.

RISC System/6000 Attachment

The 1GB SCSI Disk Drive connects to the RISC System/6000 system unit using an appropriate cable to an IBM SCSI controller.

IBM 1.07GB Serial Disk Drive

The 1.07GB Serial-Link Disk Drive is a 5.25-inch high-performance drive that features an average seek time of 11.2 milliseconds and a rotational speed of 4986 rpm. The drive can operate in dual simplex mode, transmitting and receiving simultaneously.

The storage device can be used in the IBM 9333 Model 10 or Model 500 High-Performance Subsystem.

See page 1-83 for information on which systems use this drive through the IBM 9333.

RISC System/6000 Attachment

The 1.07GB Serial-Link Disk Drive connects to the RISC System/6000 system unit using an appropriate cable to an IBM 9333 High-Performance Subsystem Adapter.

IBM 1.37GB SCSI Disk Drive

The 1.37 GB SCSI Disk Drive is a 5.25-inch high-performance drive that features an average seek time of 12 milliseconds and a rotational speed of 5400 rpm.

See page 1-83 for information on which systems use this drive.

RISC System/6000 Attachment

The 1.37GB SCSI Disk Drive connects to the RISC System/6000 system unit using an appropriate cable to an IBM SCSI controller.

IBM 2GB SCSI-2 Disk Drive

The 2GB SCSI Disk Drive is a 3.5-inch high-performance drive that features an average seek time of 9.5 milliseconds and a rotational speed of 5400 rpm.

See page 1-83 for information on which systems use this drive.

RISC System/6000 Attachment

The 2GB SCSI Disk Drive connects to the RISC System/6000 system unit using an appropriate cable to an IBM SCSI controller.

IBM 2.4GB SCSI-2 Disk Drive

The 2.4GB SCSI Disk Drive is a 5.25-inch high-performance drive that features an average seek time of 9.8 milliseconds and a rotational speed of 4316 rpm.

See page 1-83 for information on which systems use this drive.

RISC System/6000 Attachment

The 2.4GB SCSI Disk Drive connects to the RISC System/6000 system unit using an appropriate cable to an IBM SCSI controller.

IBM 7203 Model 001 External Portable Disk Drive

The 7203 Model 001 is a self-powered external disk drive that includes a removable disk drive module that can provide portability and enhanced data security. See page 1-83 for information on which systems use this drive.

The unit will support one disk drive module containing either a 355MB or 1.0GB drive. As a selectable option, you can replace the standard 355MB module with a 1.0GB module. Additional modules are available as feature options.

See page 1-259 for physical, electrical, and environmental considerations for the drive.

IBM 355MB Portable Disk Drive Module

The 355MB Portable Disk Drive Module contains a shock-mounted 5.25-inch IBM 355MB SCSI Disk Drive.

The 355MB Portable Disk Drive Module comes standard in the IBM 7203 Model 1 External Portable Disk Drive and can also be ordered separately as an additional disk module.

RISC System/6000 Attachment

The 7203 Model 001 comes with a detachable power cord and attaches to the RISC System/6000 system unit using an IBM SCSI Controller Cable to an IBM SCSI controller.

IBM 7204 Model 001 External Disk Drive

The 7204 Model 001 is a small, lightweight unit containing a 1.0GB SCSI Disk Drive that features an average access rate of 11.5 milliseconds and a rotational speed of 4316 rpm. The drive is shock-mounted in the enclosure. See page 1-83 for information on which systems use this drive.

RISC System/6000 Attachment

The 7204 Model 001 comes with a detachable power cord and attaches to the RISC System/6000 system unit using an IBM SCSI Controller Cable to an IBM SCSI controller.

IBM 7204 Model 010 External Disk Drive

The 7204 Model 010 is a small, lightweight unit containing a 1.0GB SCSI Disk Drive that features an average access rate of 8.9 milliseconds and a rotational speed of 5400 rpm. The drive is shock-mounted in the enclosure. See page 1-83 for information on which systems use this drive.

See 1-259 for physical, electrical, and environmental considerations for the drive.

RISC System/6000 Attachment

The 7204 Model 010 comes with a detachable power cord and attaches to the RISC System/6000 system unit using an IBM SCSI-2 High-Performance I/O Controller and the appropriate cable.

IBM 7204 Model 215 External Disk Drive

The 7204 Model 215 is a small, lightweight unit containing a 2.0GB Differential SCSI Disk Drive that features an average access rate of 9.5 milliseconds and a rotational speed of 5400 rpm. The drive is shock-mounted in the enclosure. The 7204 Model 215 External Disk Drive attaches to the RISC System/6000 system unit through the SCSI-2 Differential High-Performance I/O Controller. The 7204 Model 215 can attach to two SCSI-2 Differential High-Performance External I/O Controllers in different POWERserver systems to allow shared storage, or high availability configurations. See page 1-83 for information on which systems use this drive.

See 1-259 for physical, electrical, and environmental considerations for the drive.

RISC System/6000 Attachment

The 7204 Model 215 comes with a detachable power cord and attaches to the RISC System/6000 system unit using an IBM SCSI-2 Differential High-Performance External I/O Controller and the appropriate cable.

IBM 7204 Model 320 External Disk Drive

The 7204 Model 320 is a small, lightweight unit containing a 320MB SCSI Disk Drive that features an average access rate of 12.5 milliseconds and a rotational speed of 4813 rpm. The drive is shock-mounted in the enclosure. See page 1-83 for information on which systems use this drive.

RISC System/6000 Attachment

The 7204 Model 320 comes with a detachable power cord and attaches to the RISC System/6000 system unit using an IBM SCSI Controller Cable to an IBM SCSI controller.

System Unit Disk Drive Usage Summary

In the tables below, an "X" indicates that a drive can be used with a given system unit.

Some of the drives below that are shown as being used with a system unit cannot be used as an internal disk drive. In these cases, the disk drives are used in an external expansion unit or drawer attached to the RISC System/6000 system unit. A maximum of seven SCSI devices can be attached to one SCSI I/O Controller.

System Unit	200MB SCSI Drive	400MB SCSI Drive	540MB SCSI Drive	670MB SCSI Drive	857MB SCSI Drive	857MB Serial Drive ¹	4869 External Disk Drive	1.2MB 5.25-in. diskette internal
Model M20/M2A	X ²	X ²		X ²				
Models 220/22W	X	X	X	X ³	X ³			
Model 230	X	X	X	X ³	X ³			
Model 23W	X	X	X	X ³	X ³			
Model 23S	X	X	X	X ³	X ³			
Model 23T	X	X	X	X ³	X ³			
Model 250	X		X	X ³	X ³			
Model 25W	X		X	X ³	X ³			
Model 25S	X		X	X ³	X ³			
Model 25T	X		X	X ³	X ³			
Models 355/365/375		X	X	X ³	X ³			
Models 34H/360/36T/370/37T		X	X	X ³	X ³	X		
Model 52H		X	X	X	X	X	X	X
Model 550L						X		
Model 570						X		
Model 580				X	X	X		
Model 58H				X	X	X		
Model 590				X	X	X		
Model 970B				X	X	X		
Model 980B				X	X	X		
Model 990				X	X	X		

Notes:

1. The 857MB, 1.07GB and 2GB Serial Disk Drives can only be used in an IBM 9333 Models 010 and 011, or Models 500 and 501 that are attached to a RISC System/6000 system unit.
2. M20/M2A have no internal disk drive capacity, these drives must be installed in external SCSI enclosures.
3. Because of physical size, drive must be installed in external SCSI enclosures.

System Unit	1.0GB SCSI-2 Drive ⁵	1.07GB Serial Drive ¹	1.37GB SCSI Drive	2.0GB SCSI-2 Drive ⁵	2.0GB Serial Drive ¹	2.4GB SCSI Drive ⁴	7203, 7204	3510 - 010 PS/2 SCSI Storage Enclosure
Models M20/M2A ⁶	X ²						X	X
Models 220/230	X		X ³	X		X ³	X	X
Model 22W	X		X ³	X		X ³	X	X
Model 23W	X		X ³	X		X ³	X	X
Model 23S	X		X ³	X		X ³	X	X
Model 23T	X		X ³	X		X ³	X	X
Model 250	X		X ³	X		X ³	X	X
Model 25W	X		X ³	X		X ³	X	X
Model 25S	X		X ³	X		X ³	X	X
Model 25T	X		X ³	X		X ³	X	X
Models 355/365/375	X		X	X			X	
Models 34H/360/ 36T/370/ 37T	X	X	X	X	X	X	X	
Model 52H	X	X	X	X	X	X	X	
Model 550L	X	X	X	X	X	X	X	
Model 570	X	X	X	X	X	X	X	
Model 580	X	X	X	X	X	X	X	
Model 58H	X	X	X	X	X	X	X	
Model 590	X	X	X	X	X	X	X	
Model 970B	X	X	X	X	X	X	X ⁶	
Model 980B	X	X	X	X	X	X	X ⁶	
Model 990	X	X	X	X	X	X	X ⁶	

Notes:

1. The 857MB, 1.07GB and 2GB Serial Disk Drives can only be used in an IBM 9333 Models 010 and 011 or Models 500 and 501 that is attached to a RISC System/6000 system unit.
2. M20/M2A have no internal disk drive capacity, these drives must be installed in external SCSI enclosures .
3. Because of physical size, drive must be installed in external SCSI enclosures.
4. Each 2.4GB drive uses two SCSI bus addresses.
5. This drive comes with a single-ended attachment interface or a differential attachment interface.
6. Requires factory only FC 6094

Disk Drive Specifications

Parameter	Models							
	30MB DBA	160MB SCSI	200MB SCSI-2 ³	320MB SCSI	355MB SCSI	400MB SCSI	540MB SCSI-2 ³	670MB SCSI
Formatted Capacity (MB)	30	160	200	320	355	400	546	670
Rotational Speed (RPM)	3600	3600	4320	4316	3600	4316	6300	3600
Start Time (sec)	20	32	30	30	30	30	30	30
Cylinders (User Accessible)	928	1021	1190	949	1626	1199	2466	1626
Heads	2	8	4	14	8	14	7	15
Sectors per Track	33	39	44 to 66	48	54	48	48-87	54
Media Transfer Rate (MB/sec)	1.275	1.5	2 to 3	2	1.9	2	2.5-4.7	1.9
One Track Read (MB/sec)	1.275	0.91	1.5 to 2.3	1.7	1.6	1.7	1.5	1.6
Bus Transfer Rate (Peak MB/sec)	N/A	5	5	4	4	5	10	4
Rotational Latency (ms)	8.33	8.33	6.94	6.95	8.33	6.95	4.76	8.33
Seek Times (ms) ²								
1-Track	8	5	5	2	4.9	1.4	1.6	4.9
Average	19	16	12	12.5	16	11.5	8.5	18
Maximum	40	28	25	25	35	20	18.5	35
Power Dissipation (watts)	5	14	14	16	35	16	14	35
Weight (kg)	.6	.85	.41	1	3.2	1	0.6	3.2
Form Factor (inches)	3.5	3.5	3.5	3.5	5.25	3.5	3.5	5.25

Notes:

1. The numbers for the various devices in this table are typical. Individual devices may differ. The device specifications contain the amount of deviation expected.
2. Seek times assume 4 read-seek operations for every 1 write-seek operation.
3. Drive employs a variable frequency recording technique such that linear bit density varies with cylinder position (radius). The values given represent the average or typical values at the innermost and outermost cylinders. The 200MB drive has a one-half-high, 3.5-inch form factor. The 540MB drive has a one-inch-high, 3.5-inch form factor.

Parameter	Models							
	857MB SCSI	857MB Serial	2.4GB SCSI-2	1GB SCSI-2	1.07GB Serial	1.37GB SCSI	2.0GB Serial	2.0GB SCSI-2 ⁴
Formatted Capacity (MB)	857	857	2400	1040	1070	1370	2013	2013
Rotational Speed (RPM)	4986	4986	4316	4316	4986	5400	5400	5400
Start Time (sec)	30	30	30	30	30	30	30	30
Cylinders (User Accessible)	1458	1458	2463	2463	1823	2098	2577	2577
Heads	20	20	15x2	13	20	17	15	15
Sectors per Track	58	58	67	67	58	61-85 ³	94	94
Media Transfer Rate (MB/sec)	3	3	3	3	3	3.25-4.54 ³	5.22	5.22
One Track Read (MB/sec)	2.4	2.4	2.4	2.4	2.4	2.7-3.8 ³	3.9	3.9
Bus Transfer Rate (Peak MB/sec)	4	8	10	10	8	5	8	10
Rotational Latency (ms)	6.02	6.02	6.95	6.95	6.02	5.56	5.56	5.56
Seek Times (ms) ²								
1-Track	2	2	1.5	1.5	2	2	1	1
Average	11.2	11.2	9.8	9.8	11.2	12	9.5	9.5
Maximum	28	28	22	22	28	25	17.77	17.77
Power Dissipation (watts)	40	40	26	13	40	40	16	16
Weight (kg)	3.5	3.5	3	1	6	3.6	1	1
Form Factor (inches)	5.25	5.25	5.25	3.5	5.25	5.25	3.5	3.5

Notes:

1. The numbers for the various devices in this table are typical. Individual devices may differ. The device specifications contain the amount of deviation expected.
2. Seek times assume 4 read-seek operations for every 1 write-seek operation.
3. Drive employs a variable frequency recording technique such that linear bit density varies with cylinder position (radius). The values given represent the average or typical values at the innermost and outermost cylinders.
4. The 2.0GB SCSI-2 Disk Drive comes with a single-ended interface and a differential interface.

Tape, Optical Read/Write, and CD-ROM Drives

IBM 1.2GB Internal 1/4-Inch Cartridge Tape Drive

The 1.2GB Internal 1/4-Inch Cartridge Tape Drive operates in a streaming mode and provides data interchange and save/restore capabilities for the 7015 POWERserver. The tape drive is housed in either the processor drawer or the SCSI device drawer.

The drive can read IBM 6157 Model 1 tapes, and can read and write IBM 6157 Model 2 tapes, 7207-001 tapes, and 7207-011 tapes. It uses IBM 1.2GB Data Cartridge or the equivalent.

The drive features the following:

- Support for the following standards:
 - QIC-24 (read only)
 - QIC-120 (read and write)
 - QIC-150 (read and write)
 - QIC-525 (read and write, with ECC)
 - QIC-1000 (read and write, with ECC)
- 1.2GB capacity per cartridge
- 18MBpm sustained data rate.

See page 1-95 for information on which system units use this drive.

RISC System/6000 Attachment

The drive attaches to the RISC System/6000 system unit using an internal cable to an IBM SCSI High-Performance I/O Controller.

IBM 7207 Model 012 1.2GB External 1/4-Inch Cartridge Tape Drive

The 7207 Model 012 1.2GB External 1/4-Inch Cartridge Tape Drive operates in a streaming mode and provides up to 1.2GB of data storage per cartridge.

The drive can read and write IBM 6157 Model 1 and 2 tapes, and 7207-001 and 7207-011 tapes. It uses IBM 1.2GB Data Cartridge or the equivalent.

The drive features the following:

- Support for the following standards:
 - QIC-24 (read only, without ECC)
 - QIC-120 (read and write, without ECC)
 - QIC-150 (read and write, without ECC)
 - QIC-525 (read and write)
 - QIC-1000 (read and write)

The 7207-012 Tape Drive has a sustained data transfer rate of 18MBpm (300KBps).

See page 1-95 for information on which system units use this drive.

See page 1-259 for more information on the physical, electrical, and environmental considerations for the drive.

RISC System/6000 Attachment

The 7207 Model 012 comes with a detachable power cord and attaches to the RISC System/6000 system unit using an IBM SCSI Controller Cable to an IBM SCSI controller.

IBM 7206 Model 001 2.0GB External 4-mm Tape Drive

The 7206 Model 001 2.0GB External 4-mm Tape Drive is an externally packaged streaming tape drive that uses the IBM 4-mm DDSIII data cartridge or equivalent. The drive is primarily used for save/restore operations, archiving, and software and document distribution.

The drive features the following:

- Capacity of up to 2.0GB per cartridge
- DDS-data format with data compression
- Capacity of up to 4.0GB with compression
- 183KBps typical data transfer rate
- 376KBps typical with compression
- 12MBpm data transfer rate.

See page 1-95 for information on which system units use this drive.

See page 1-259 for more information on the physical, electrical, and environmental considerations for the drive.

RISC System/6000 Attachment

The 7206 Model 001 attaches to the RISC System/6000 system unit using an IBM SCSI controller cable to an IBM SCSI controller.

IBM 2.3GB Internal 8-mm Tape Drive

The 2.3GB Internal 8-mm Tape Drive is a streaming tape drive that uses the IBM 8-mm data cartridge or the equivalent. The drive is primarily used for save/restore operations, archiving, and software and document distribution.

The drive features the following:

- Support for the following:
- ANSI X3B5/89-054–American National Standard for Helical-scan Digital Computer Tape Cartridge, 8-mm (0.315 in.) for information exchange
- Capacity of up to 2.3GB per cartridge
- 245KBps data transfer rate
- 14.7MBpm data transfer rate
- Full-high 5.25-inch form factor.

See page 1-95 for information on which system units use this drive.

RISC System/6000 Attachment

The drive attaches to the RISC System/6000 system unit using an internal cable to an IBM SCSI High-Performance I/O Controller.

IBM 7208 Model 001 2.3GB External 8-mm Tape Drive

The 7208 Model 001 2.3GB External 8-mm Tape Drive is an externally packaged streaming tape drive that uses the IBM 8-mm data cartridge or equivalent. The drive is primarily used for save/restore operations, archiving, and software and document distribution.

The drive features the following:

- Support for the following standard
 - ANSI X3B5/89-054–American National Standard for Helical-Scan Digital Computer Tape Cartridge, 8-mm (0.315 in.) for information exchange.
- Capacity of up to 2.3GB per cartridge
- 245KBps data transfer rate
- 14.7MB-per-minute data transfer rate.

See page 1-95 for information on which system units use this drive.

See page 1-259 for more information on the physical, electrical, and environmental considerations for the drive.

RISC System/6000 Attachment

The 7208 Model 001 comes with a detachable power cord and attaches to the RISC System/6000 system unit using an IBM SCSI Controller Cable to an IBM SCSI controller.

IBM 4.0GB Internal 4-mm Tape Drive

The 4.0GB Internal 4-mm Tape Drive is a streaming tape drive that uses the IBM DDSIIII or DDS2 data cartridge or equivalent. Data compression is available, effectively increasing the cartridge capacity and data transfer rate. Communications on the SCSI bus can be either asynchronous or synchronous. The drive is primarily used for data interchange, save/restore operations, and archiving.

The drive features the following:

- 5.25-inch form factor
- DDS-data format with data compression
- Capacity of up to 4GB per cartridge (8GB typical with compression)
- 400KBps data transfer rate (800KBps with compression)
- Compatible with 2GB DDS format.

See page 1-95 for information on which system units use this drive.

Tape Cartridge Compatibility

The 4-mm tape drive is compatible with existing 4-mm tape subsystems that are designed to operate with Digital Data Storage approved media, which meet the following standards:

- For DDSIIII
 - American National Standards Institute (ANSI) standard, X3.203-1991, *Helical-Scan Digital Computer Tape Cartridge, 3.81-mm*
 - European Computer Manufacturers Association (ECMA) standard, ECMA-150, *3.81-mm Wide Magnetic Tape Cartridge DDSIIII format.*
- For DDS2
 - European Computer Manufacturers Association (ECMA) standard, ECMA/TC17/93/20. *3.81-mm Wide Magnetic Tape Cartridge for Information Interchange Helical Scan Recording, DDS2 format.*

The user cannot change the density setting of this drive. Depending on the media type installed, the device reconfigures itself automatically as follows:

Media Type	Device Configuration
DDS	Read-only
DDSIIII	Read/Write in 2.0GB mode only
Non-DDS	Not supported; cartridge will eject
DDS2	Read in either density; write in 4.0GB mode only.

RISC System/6000 Attachment

The drive attaches to the RISC System/6000 system unit using a cable to an IBM SCSI I/O Controller.

IBM 7206 Model 005 4.0GB External 4-mm Tape Drive

The 4.0GB External 4-mm Tape Drive is a streaming tape drive that uses the IBM DDSIIII or DDS2 data cartridge or equivalent. Data compression is available, effectively increasing the cartridge capacity and data transfer rate. Communication on the SCSI bus can be either asynchronous or synchronous. The drive is primarily used for data interchange, save/restore operations, and archiving.

The drive features the following:

- 5.25-inch form factor
- DDS-data format with data compression
- Capacity of up to 4GB per cartridge (8GB typical with compression)
- 400KBps data transfer rate (800KBps with compression)
- Compatible with 2GB DDS-1 format.

See page 1-95 for information on which system units use this drive.

See page 1-259 for more information on the physical, electrical, and environmental considerations for the drive.

Tape Cartridge Compatibility

The 4-mm tape drive is compatible with existing 4-mm tape subsystems that are designed to operate with Digital Data Storage approved media, which meet the following standards:

- For DDSIIII
 - American National Standards Institute (ANSI) standard, X3.203-1991, *Helical-Scan Digital Computer Tape Cartridge, 3.81-mm*
 - European Computer Manufacturers Association (ECMA) standard, ECMA-150, *3.81-mm Wide Magnetic Tape Cartridge DDSIIII format.*
- For DDS2
 - European Computer Manufacturers Association (ECMA) standard, ECMA/TC17/93/20. *3.81-mm Wide Magnetic Tape Cartridge for Information Interchange Helical Scan Recording, DDS2 format.*

The user cannot change the density setting of this drive. Depending on the media type installed, the device reconfigures itself automatically as follows:

Media Type	Device Configuration
DDS	Read-only
DDSIIII	Read/Write in 2.0GB mode only
Non-DDS	Not supported; cartridge will eject
DDS2	Read in either density; write in 4.0GB mode only.

RISC System/6000 Attachment

The 7206 Model 005 comes with a detachable power cord and attaches to the RISC System/6000 system unit using an IBM SCSI Controller Cable to an IBM SCSI controller.

IBM 5.0GB Internal 8-mm Tape Drive

The 5.0GB Internal 8-mm Tape Drive is a streaming tape drive that uses the IBM 8-mm data cartridge or equivalent. Data compression is available, effectively increasing the cartridge capacity and data transfer rate. Communications on the SCSI bus can be either asynchronous or synchronous. The drive is primarily used for save/restore operations, archiving, and software and document distribution.

The drive features the following:

- Capacity of up to 5GB per cartridge
- 500KBps data transfer rate
- 10GB typical with compression
- 1MBps typical with compression
- Half-High 5.25-inch form factor.

See page 1-95 for information on which system units use this drive.

See page 1-259 for more information on the physical, electrical, and environmental considerations for the drive.

Tape Cartridge Compatibility

The 8-mm tape drive is compatible with existing 8-mm tape subsystems that comply to the American National Standard (ANSI) X3B5/89-136, Helical-Scan Digital Computer Tape Cartridge, 8-mm for Information Exchange.

8-mm Tape Drive	Format Modes			
	2.3GB	2.3GB (C*)	5.0GB	5.0GB (C*)
2.3 GB	Read/Write			
5.0GB	Read/Write	Read only	Read/Write	Read/Write

Note: C*= compression.

RISC System/6000 Attachment

The drive attaches to the RISC System/6000 system unit using a cable to an IBM SCSI I/O Controller.

IBM 7208 Model 011 5.0GB External Tape Drive

The 7208 Model 011 Tape Drive is a streaming tape drive that uses the IBM 8-mm data cartridge or equivalent. Data compression is available, effectively increasing the cartridge capacity and data transfer rate. Communications on the SCSI bus can be either asynchronous or synchronous. The drive is primarily used for save/restore operations, archiving, and software and document distribution.

The drive features the following:

- Capacity of up to 5GB per cartridge
- 500KBps data transfer rate
- 10GB typical with compression
- 1MBps typical with compression
- Half-High 5.25-inch form factor.

See page 1-95 for information on which system units use this drive.

See page 1-259 for more information on the physical, electrical, and environmental considerations for the drive.

Tape Cartridge Compatibility

The 8-mm tape drive is compatible with existing 8-mm tape subsystems that comply to the American National Standard (ANSI) X3B5/89-136, Helical-Scan Digital Computer Tape Cartridge, 8-mm for Information Exchange.

8-mm Tape Drive	Format Modes			
	2.3GB	2.3GB (C*)	5.0GB	5.0GB (C*)
2.3GB	Read/Write			
5.0GB	Read/Write	Read only	Read/Write	Read/Write

Note: C*=compression.

RISC System/6000 Attachment

The 7208 Model 011 attaches to the RISC System/6000 system unit using a cable to an IBM SCSI I/O Controller.

IBM 9348 Model 012 Magnetic Tape Unit

The 9348 Model 012 Magnetic Tape Unit is an autoloading, autothreading, tabletop tape drive.

The unit features the following:

- Support for the following standards:
 - ANSI X3.39-1973—Recorded magnetic tape (1600 CPI, Phase Encoded Recording)
 - ANSI X3.54-1976—Recorded magnetic tape (6250 CPI, Group Coded Recording)
 - ANSI X3.131-1986—Small Computer System Interface (SCSI)
 - ANSI X3T9.2-85-82 (REV 4B)—Common command set of the SCSI
 - ANSI X3.40-1983—Unrecorded magnetic tape (9-track 800 CPI, NRZI, 1600 CPI, PE, and 6250 CPI, GCR)
- Standard 9-track tape interchange plus fast save/restore operations
- IBM standard 9-track recording format (8 data plus parity)
- Selectable tape density: 6250 bpi (GCR Mode) or 1600 bpi (PE Mode)
- 1MB buffer
- Tape speed: 123 ips (GCR Mode), 130 ips (PE Mode)
- Nominal data throughput rate of 768KBps (GCR Mode), 208KBps (PE Mode).

See page 1-95 for information on which system units use this drive.

See page 1-259 for more information on the physical, electrical, and environmental considerations for the drive.

RISC System/6000 Attachment

The tape unit attaches to the RISC System/6000 system unit using an IBM SCSI Controller Cable to an IBM SCSI controller.

IBM 7209 Model 001 External Rewritable Optical Disk Drive

The 7209 Model 001 External Rewritable Optical Disk Drive is an externally packaged optional rewritable optical disk drive that supports the use of online databases and the distribution of large files such as those used in the multimedia industry. It features an industry-standard SCSI interface.

The drive features the following:

- 180KBps data transfer rate (write)
- 620KBps data transfer rate (read)
- Capacity of approximately 595MB per rewritable optical cartridge
- 70 ms random access (nominal).

See page 1-95 for information on which system units use this drive.

See page 1-259 for more information on the physical, electrical, and environmental considerations for the drive.

RISC System/6000 Attachment

The 7209 Model 001 comes with a detachable power cord and attaches to the RISC System/6000 system unit using an IBM SCSI Controller Cable to an IBM SCSI controller.

IBM 7209 Model 002 External Rewritable Optical Disk Drive

The 7209 Model 002 External Rewritable Optical Disk Drive is an externally packaged optional rewritable optical disk drive that supports the use of online databases and the distribution of large files such as those used in the multimedia industry. It features an industry standard SCSI-2 interface.

The drive features the following:

- 735 (ID) to 1424 (OD)KBps data transfer rate (read)
- Capacity of approximately 1180MB per rewritable optical cartridge
- Optionally uses a 595MB capacity disk.
- 60ms random access.

See page 1-95 for information on which system units use this drive.

See page 1-259 for more information on the physical, electrical, and environmental considerations for the drive.

RISC System/6000 Attachment

The 7209 Model 002 comes with a detachable power cord and attaches to the RISC System/6000 system unit using an IBM SCSI Controller Cable to an IBM SCSI controller.

IBM Internal CD-ROM Drive

The internal CD-ROM Drive is a read-only optical compact disc drive that supports distribution and use of online databases (for example, InfoExplorer).

The drive has the following features:

- 150KBps data transfer rate
- Capacity of approximately 600MB per disc
- 325 ms random access (nominal).

The compact disc resides in a caddy that is inserted into the drive.

See page 1-95 for information on which system units use this drive.

RISC System/6000 Attachment

The drive attaches to the RISC System/6000 system unit using an internal cable to an IBM SCSI High-Performance I/O Controller. A jack for audio output is provided on the CD-ROM bezel.

IBM Internal CD-ROM-2 Drive

The internal CD-ROM-2 Drive is a read-only optical compact disc drive that supports distribution and use of online databases (for example, InfoExplorer).

The drive has the following features:

- 330KBps data transfer rate
- Capacity of approximately 600MB per disc
- 200 ms random access (nominal).

The compact disc resides in a caddy that is inserted into the drive.
See page 1-95 for information on which system units use this drive.

RISC System/6000 Attachment

The drive attaches to the RISC System/6000 system unit using an internal cable to an IBM SCSI High-Performance I/O Controller. A jack for audio output is provided on the CD-ROM bezel.

IBM 7210 Model 001 External CD-ROM Drive

The 7210 Model 001 External CD-ROM Drive is an externally packaged optional read-only optical compact disc drive that supports distribution and use of online databases (for example, InfoExplorer).

The drive features the following:

- 150KBps data transfer rate
- Capacity of approximately 600MB per disc
- 325 ms random access (nominal).

The compact disc resides in a caddy that is inserted into the drive.

See page 1-95 for information on which system units use this drive.

See page 1-259 for more information on the physical, electrical, and environmental considerations for the drive.

RISC System/6000 Attachment

The 7210 Model 001 comes with a detachable power cord and attaches to the RISC System/6000 system unit using an IBM SCSI Controller Cable to an IBM SCSI controller. A jack for audio output is provided on the CD-ROM bezel.

IBM 7210 Model 005 External CD-ROM Drive

The 7210 Model 005 External CD-ROM Drive is an externally packaged optional read-only optical compact disc drive that supports distribution and use of online databases (for example, InfoExplorer).

The drive features the following:

- 330KBps data transfer rate
- Capacity of approximately 600MB per disc
- 200 ms random access (nominal).

The compact disc resides in a caddy that is inserted into the drive.

One media kit is included with the 7210-005. The media kit contains one test disc and one disk caddy.

See page 1-95 for information on which system units use this drive.

See page 1-259 for more information on the physical, electrical, and environmental considerations for the drive.

RISC System/6000 Attachment

The 7210 Model 005 comes with a detachable power cord and attaches to the RISC System/6000 system unit using an IBM SCSI Controller Cable to an IBM SCSI Controller. A jack for audio output is provided on the CD-ROM bezel.

System Unit Tape, Read/Write Optical, and CD-ROM Usage Summary

In the following tables, an "X" indicates that a drive can be used with the system unit and that there is no stated limit for the number of drives that can be used. Numbers given indicate the maximum number of drives that can be used with a system unit.

System Units	Devices								
	1.2GB Internal 1/4-In. Tape	1.2 GB External 1/4-In. Tape	2.0GB External 4-mm Tape	2.3GB Internal 8-mm Tape	2.3GB External 8-mm Tape	4.0GB Internal 4-mm Tape	4.0GB External 4-mm Tape	5GB Internal 8-mm Tape	5GB External 8-mm Tape
		MT7207 Model 012	MT7206 Model 001		MT7208 Model 001		MT7206 Model 005		MT7208 Model 011
Models M20/M2A		X			X		X		X
Model 220		X	X		X		X		X
Model 22W		X	X		X		X		X
Model 230		X	X		X		X		X
Models 23T/W/S		X	X		X		X		X
Model 250		X	X		X		X		X
Models 25W/S/T		X	X		X		X		X
Model 34H		X	X		X		X		X
Models 360/36T		X	X		X		X		X
Models 370/37T		X	X		X		X		X
Model 355, 365, 375		X	X		X		X		X
Model 52H		1	1	1	X	1	X	1	X
Model 550L		1	1	1	X	1	X	1	X
Model 570		1	1	1	X	1	X	1	X
Model 580		1	1	1	X	1	X	1	X
Model 58H		1	1		X	1	X	1	X
Model 590		1	1		X	1	X	1	X
Model 970B	2	X*	1*	2	1*	5	X*	6	1*
Model 980B	2	X*	1*	2	1*	5	X*	6	1*
Model 990	2	X*	1*		1*	5	X*	6	1*

Note: *Requires FC 6094 Factory only.

System Units	Devices							
	Tape Drive 1/2-Inch ¹	Tape Drive 1/2-Inch Drawer	Rewrit-able Opti-cal Disk	Rewrit-able Opti-cal Disk	CD-ROM Internal	CD-ROM-2 Internal	CD-ROM External	CD-ROM External
	MT9348 Model 012		7209 Model 001	7209 Model 002			MT7210 Model 001	MT7210 Model 005
Models M20/M2A							X	X
Model 220	1		X	X			X	X
Model 22W	1		X	X			X	X
Model 230	1		X	X			X	X
Models 23W/S/T	1		X	X			X	X
Model 250	1		X	X				X
Models 25W/S/T	1		X	X				X
Model 34H	1		X	X			X	X
Models 360/36T	1		X	X			X	X
Models 370/37T	1		X	X			X	X
Models 355, 365, 375	1		X	X			X	X
Model 52H	1		X	X	1	1	X	X
Model 550L	1		X	X	1	1	X	X
Model 570	1		X	X	1	1	X	X
Model 580	1		X	X	1	1	X	X
Model 58H			X	X	1	1		X
Model 590			X	X	1	1		X
Model 970B		3 ¹	X ²	X ²	6	6	X ²	X ²
Model 980B		3 ¹	X ²	X ²	6	6	X ²	X ²
Model 990		3 ¹	X ²	X ²	6	6		X ²

Notes:

1. The Machine Type 7015 can use the 1/2-inch tape drive drawer. One 1/2-inch tape drive per rack. The 7202 Model 900 supports one 1/2-inch tape drive per Model 900 for two racks, a total of three per system.
2. Requires FC 6094 factory only.

Expansion Rack and Expansion Units

IBM 9333 Model 010 High-Performance Disk Drive Subsystem

The 9333 Model 010 High-Performance Subsystem Disk Drive significantly increases the maximum supported disk storage configurations for rack-mounted system units. The 9333 Model 010 drawer can contain a maximum of four 5.25-inch internal 857MB, or 1.07GB serial-link disk drives, for a maximum total disk storage per drawer of 4.28GB.

The serial interface of the 9333 High-Performance Disk Drive Model 010 High-Performance Disk Drive Subsystems offers the following advantages over the Small Computer System Interface (SCSI) interface of the 9334 Expansion Units:

- Interactive performance characteristics that can allow more users to be supported at the same response time than could be supported with the same number of SCSI disk drives
- Larger maximum external disk storage configurations (17.12GB per adapter)
- Higher throughput, which can mean increased workload throughput for compute-intensive applications
- Reduced controller/adapter overhead
- Improved I/O slot usage (16 serial-link drives supported at full performance by a single adapter, compared with four to seven SCSI disk drives supported per I/O slot)
- Higher speed, full-duplex, point-to-point connection to system, compared to the SCSI drop bus
- Support for high availability configurations (independent links to two RISC System/6000 system units).
- An optional feature code is available so this subsystem can be used with - 48V input power.

The drawer can be placed either in the IBM 7202 Model 900 Expansion Rack or in the system rack of a RISC System/6000 POWERserver 900 series system.

The drawer occupies four EIA units of vertical mounting space in the supported racks and weighs 13.6 kg (30 lbs.), plus the weight of the installed devices.

RISC System/6000 Attachment

The 9333 Model 010 connects to an IBM High-Performance Disk Drive Subsystem Adapter using an IBM Serial-Link Cable that comes with the drawer. A power control cable can be ordered to allow a highly available configuration. For more information on cables, see page 1-217.

IBM 9333 Model 011 High-Performance Disk Drive Subsystem

The 9333 Model 011 can contain a maximum of four serial-link disk drives. They can be any combination of 857MB, 1.07GB or 2.0GB disk drives. The maximum disk storage per drawer is 8GB. The maximum storage per adapter is 32GB in four drawers.

In addition to the advantages listed for the 9333 Model 010, in the Model 011 the two independent system attachments capability provided by all models of the 9333 is enhanced by the Multiple Systems Attachment features which can provide up to eight system attachments. Furthermore, the High-Performance Subsystem Adapter 40/80MB/Sec supports the attachment of up to four subsystems, for a maximum disk storage capacity per adapter of 32GB.

The IBM 9333 Model 011 is designed for integration into the system rack of a RISC System/6000 POWERserver 900 series system, or into an attached IBM 7202 Model 900 Expansion Rack.

RISC System/6000 Attachment

The 9333 Model 011 connects to an IBM High-Performance Subsystem Adapter 40/80 MB/sec in the RISC System/6000 using an IBM Serial-Link Cable that comes with the drawer. A power control cable can be ordered to allow a highly available configuration. For more information on the cables mentioned, see page 1-217.

The IBM 9333 High-Performance Disk Drive Subsystem provides two independent system attachments to allow sharing of storage between systems. This capability is enhanced by the Multiple Systems Attachment features which can provide up to eight system attachments.

IBM 9333 Model 500 High-Performance Disk Drive Subsystem

The 9333 Model 500 High-Performance Disk Drive Subsystem significantly increases the maximum supported disk storage configurations for RISC System/6000.

The 9333 Model 500 also has the same advantages as the 9333 Model 010. The 9333 Model 500 is a free-standing deskside unit for attachment to POWERstation/POWERserver 300 and 500 series systems.

RISC System/6000 Attachment

The 9333 Model 500 connects to an IBM High-Performance Disk Drive Subsystem Adapter using an IBM Serial-Link Cable that comes with the subsystem. For more information on the cable, see page 1-217.

IBM 9333 Model 501 High-Performance Disk Drive Subsystem

The optional 9333 Model 501 High-Performance Disk Drive Subsystem significantly increases the maximum supported disk storage for desktop and deskside RISC System/6000 systems.

In addition to the advantages listed for the 9333 Model 010, in the Model 501 the two independent system attachments capability provided by all models of the 9333 is enhanced by the Multiple Systems Attachment features which can provide up to eight system attachments. Furthermore the High-Performance Subsystem Adapter 40/80MB/Sec supports the attachment of up to four subsystems, for a maximum disk storage capacity per adapter of 32GB.

The IBM 9333 Model 501 is a free-standing deskside unit for attachment to POWERstation/POWERserver 300 and 500 series systems.

RISC System/6000 Attachment

The 9333 Model 501 connects to an IBM High-Performance Subsystem Adapter 40/80 MB/sec using an IBM Serial-Link Cable that comes with the subsystem. For more information on the cable, see page 1-217.

The IBM 9333 High-Performance Disk Drive Subsystem provides two independent system attachments to allow sharing of storage between systems. This capability is enhanced by the Multiple Systems Attachment features which can provide up to eight system attachments.

IBM 9334 Model 010 SCSI Expansion Unit

The 9334 Model 010 SCSI Expansion Unit can contain a maximum of four single-ended SCSI 3.5-inch or 5.25-inch internal drives, either 670 or 857MB, or 1.0, 1.37, 2.0 or 2.4GB (three maximum plus a single 2.0GB disk drive), for a maximum total disk storage per drawer of 9.2GB. The 9334 Model 010 drawer comes standard with one 670MB SCSI Disk

Drive and can be placed either in the IBM 7202 Model 900 Expansion Rack or the 7015 system rack.

RISC System/6000 Attachment

The 9334 Model 010 connects to an IBM SCSI High Performance I/O Controller or SCSI-2 High-Performance I/O Controller using an IBM SCSI Controller Cable. The cable must be specified when the drawer is ordered, a SCSI-2 cable with a SCSI-2 I/O Controller or a SCSI cable with a SCSI I/O controller. For more information on the cable, see page 1-217.

IBM 9334 Model 011 SCSI Differential Expansion Unit

The 9334 Model 011 SCSI Expansion Unit can contain a maximum of four differential SCSI-2 3.5-inch internal drives, either 1.0GB or 2.0GB, for a maximum total disk storage per drawer of 8GB. The 9334 Model 011 drawer comes standard with two 1.0GB SCSI-2 Disk Drives, and can be placed either in the IBM 7202 Model 900 Expansion Rack or the 7015 system rack.

The differential SCSI-2 interface increases the supported cable length from 6 meters to 25 meters, enhancing configurability and enabling disk storage sharing between systems.

RISC System/6000 Attachment

The 9334 Model 011 attaches to an IBM SCSI-2 Differential High Performance External I/O Controller using an IBM SCSI-2 Differential Controller Cable. A drawer can be attached to two controllers, or up to two drawers can be attached to a single controller. The controller is separately orderable. A maximum of seven devices can connect to a single controller. For more information on the cable, see page 1-217.

IBM 9334 Model 500 SCSI Expansion Unit

The 9334 Model 500 SCSI Expansion Unit is a standalone deskside expansion unit that provides additional disk storage for desktop and deskside RISC System/6000 systems. The 9334 Model 500 is used with both the SCSI High-Performance I/O Controller and the SCSI-2 High-Performance I/O Controller.

The 9334 Model 500 can contain a maximum of four single-ended SCSI 3.5 or 5.25-inch internal drives, either 670 or 857MB, or 1.0, 1.37, 2.0 or 2.4GB (three maximum plus a single 2.0GB disk drive), for a maximum total disk storage of 9.2GB. The unit comes standard with one 670MB SCSI Disk Drive.

The media slot in the Model 500 provides for the attachment of the following combinations of media devices:

- One 2.3GB Internal 8-mm Tape Drive.
- One 5.0GB Internal 8-mm Tape Drives.
- One 1.2GB Internal 1/4-inch Cartridge Tape Drive
- One or two Internal CD-ROM Drives
- Internal CD-ROM Disk Drive and one 1.2GB internal 1/4-inch cartridge Tape Drive

RISC System/6000 Attachment

The 9334 Model 500 connects to an IBM SCSI High-Performance I/O Controller or an IBM SCSI-2 High Performance I/O Controller using an IBM SCSI Controller Cable. It can be attached to two controllers. The SCSI controller and cables are ordered separately. The SCSI I/O Controller Cable that is specified must match the Controller card which is ordered, a SCSI cable with the SCSI I/O Controller or a SCSI-2 cable with a SCSI-2 I/O Controller. For more information on the cable, see page 1-217.

IBM 9334 Model 501 SCSI Differential Expansion Unit

The 9334 Model 501 SCSI Expansion Unit Model 501 is a deskside expansion unit that provides additional disk storage for desktop and deskside RISC System/6000 systems.

The 9334 Model 501 can contain a maximum of four differential SCSI-2 3.5-inch internal disk drives, either 1.0GB or 2.0GB, for a maximum total disk storage of 8.0GB. The unit comes standard with two 1.0GB SCSI-2 disk drives.

In addition to the four disk drives, the unit can house a differential SCSI-2 IBM 5.0GB Internal 8-mm Tape Drive.

The differential SCSI-2 interface increases the supported cable length from 6 meters to 25 meters, enhancing configurability and enabling disk storage sharing between systems.

RISC System/6000 Attachment

The 9334 Model 501 connects to an IBM SCSI-2 Differential High-Performance External I/O Controller using an IBM SCSI-2 Differential Controller Cable. A single unit can be attached to two expansion controllers or two units can be attached to a single controller. A maximum of seven devices can connect to a single controller. For more information on the cable, see page 1-217.

IBM 7202 Model 900 Expansion Rack

The 7202 Model 900 Expansion Rack is a 1.6 m- (62 in.) high expansion rack for use with the 7015 system units. The rack, an industry-standard 19-inch rack that is designed to comply with the EIA-310C standard, contains 32 EIA units of vertical mounting space.

A power distribution unit, which provides six AC power outlets for the rack drawers, occupies four EIA units and weighs 5.0 kg (11 lbs). The rack has an immediate power-off switch.

The following options are available:

- Up to six IBM 9333 Model 010 or Model 011 Drawer High-Performance Subsystems or IBM 9334 Model 010 or Model 011 Drawer Expansion Units
- 1/2-Inch 9-Track Tape Drive Drawer (maximum of one)
- Battery Backup Unit
- Optional configurations utilizing -48 volt input power. This is available with factory only feature codes.

System Units	Devices							
	Drawer Expansion (Serial)		Deskside Expansion (Serial)		Drawer Expansion (SCSI)		Deskside Expansion (SCSI)	
	MT9333 Model 010	MT9333 Model 011	MT9333 Model 500	MT9333 Model 501	MT9334 Model 010	MT9334 Model 011 ¹	MT9334 Model 500	MT9334 Model 501 ¹
M20/M2A								
220/230							X	
22W							X	
22T							X	
23T							X	
23W							X	
250							X	X
25W							X	X
25T							X	X
25S							X	X
34H			X	X			X	X
360			X	X			X	X
370			X	X			X	X
355,365, 375							X	X
52H			4	4			4	3
550L			4	4			4	3
570			4	4			4	4
580			4	4			4	4
58H			4	4			4	4
590			4	4			4	4
970B	28	28			14	16		
980B	28	28			14	16		
990	28	28			14	16		

Notes:

1. MT 9334 Models 011 and 501 are SCSI-2 Differential devices.
2. This is the maximum number of drawers when using exclusively machine type (MT) 9333 or MT 9334. The maximum of 160GB of storage is achieved with a combination of 16 MT 9333 and 11 MT 9334.

Modems

The following modems work with the RISC System/6000 system unit. Modem support allows communication through common carrier telephone networks using dial-up or leased lines with either asynchronous protocols or the synchronous SDLC or BSC protocols. Not all of the features supported by the listed modems are supported by the RISC System/6000 software.

IBM 5841 Modem

The 5841 Modem is a standalone device that provides a means for interchanging data between the RISC System/6000 system unit and a voice-grade or equivalent communication line. The 5841 Modem transmits data in duplex mode using asynchronous transmission speeds of up to 1200 bps and synchronous transmission speeds of 600 or 1200 bps.

The 5841 Modem is compatible with the Bell 212A and 103 practices and CCITT V.22A and V.22B recommendations for transmitting data over the public-switched telephone network (PSTN).

The cable from the 5841 Modem to the telecommunications jack is 4.6 m (15 ft) in length. One end is fixed to the modem. The other end contains a miniature six-position nonkeyed plug.

RISC System/6000 Attachment

The 5841 Modem attaches to the RISC System/6000 system unit using an IBM Async Cable-EIA-232/V.24 to an IBM 8-, 16-, or 128-port EIA-232D adapter port, a standard serial port, an IBM 4-Port Multiprotocol Communications Controller port, or an IBM Multiprotocol Adapter/A (MP/A). For non-U.S. countries, the IBM 16-Port Async Adapter-EIA-232 is not approved for modem support. For more information on the Async Cable-EIA-232/V.24, see page 1-217.

Communications Network Attachment

The 5841 Modem attaches to the communications network in the following ways:

- Direct attachment to the PSTN by way of a miniature telephone jack, type USOC-RJ11
- Attachment to the PSTN through a ROLM CBX by way of a CBX analog line that ends in an RJ11 jack
- Attachment to the PSTN through a PBX or Key Telephone System by way of an analog line that ends in a miniature telephone jack, type USOC-RJ12 or USOC-RJ13.

IBM 5853 Modem

The 5853 Modem is a standalone device that provides a means for interchanging data between the RISC System/6000 system unit and a voice-grade or equivalent communication line. The 5853 Modem transmits data in duplex mode using asynchronous transmission speeds of up to 300 bps; the modem transmits in synchronous or asynchronous transmission speeds of 1200 or 2400 bps.

The 5853 Modem is compatible with the Bell 212A and 103 practices and CCITT V.22, V.24, and V.25 recommendations for transmitting data over the public-switched telephone network (PSTN). In asynchronous mode, the modem can use auto dialing with CCITT V.22 and V.24 recommendations. In synchronous mode, the modem can use only manual dialing with CCITT V.25 recommendations. The 5853 Modem supports the connection of an 801-type external Auto Call Unit (not supplied by IBM).

RISC System/6000 Attachment

The 5853 Modem attaches to the RISC System/6000 system unit using an IBM Async Cable-EIA-232/V.24 to an IBM 8-, 16-, or 128-port EIA-232D adapter port, a standard serial port, an IBM 4-Port Multiprotocol Communications Controller port, or an IBM Multiprotocol Adapter/A (MP/A). For non-U.S. countries, the IBM 16-Port Async Adapter-EIA-232 is not approved for modem support. For more information on the Async Cable-EIA-232/V.24, see page 1-217.

Communications Network Attachment

The 5853 Modem attaches to the communications network in the following ways:

- Direct attachment to the PSTN by way of a miniature telephone jack, type USOC-RJ11
- Attachment to the PSTN through a ROLM CBX by way of a CBX analog line that ends in an RJ11 jack
- Attachment to the PSTN through a PBX or Key Telephone System by way of an analog line that ends in a miniature telephone jack, type USOC-RJ12 or USOC-RJ13.

IBM 7820 ISDN Terminal Adapter

The IBM 7820 ISDN terminal adapter provides an interface between a synchronous DTE and an ISDN network. The IBM 7820 attaches to the ISDN network using the Basic Rate Interface (BRI). It attaches to the DTE via the standard CCITT connections of V.35, X.21, and V.24. The IBM 7820 can drive up to two Bearer (B) channels at a data rate of up to 64 Kbps per channel.

RISC System/6000 Attachment

The RISC System/6000 system can connect to the ISDN network through the IBM 7820 by using either the X.25 Co-processor/2 card (FC 2960) or the 4-port Multiprotocol Communications Controller (MPCC) (FC 2700) or an IBM Multiprotocol Adapter/A (MP/A).

The X.25 adapter is able to drive one B channel per adapter. Therefore, two adapters are required to support the full ISDN basic rate. The RISC System/6000 system may connect to the 7820 using the X.25 adapter with either a V.35 nonswitched, V.24 nonswitched, or X.21 nonswitched connection. Both TCP/IP and SNA can be configured to run over the X.25 adapter in this case. Both protocols are configured the same as if running over an X.25 network. Note that the IBM 7820 does not do any X.25 packet handling. This means that when the RISC System/6000 system is connected to a remote DTE using the IBM 7820, one DTE must be configured as an X.25 layer 2 DTE and the other DTE must be configured as an X.25 layer 2 DTE.

The 4-port Multiprotocol Communication Controller is able to drive two B channels per adapter. The RISC System/6000 system may connect to the 7820 using the MPCC adapter with a V.35 nonswitched, V.24 switched or nonswitched, or X.21 switched or nonswitched connection. Each B channel used requires one physical connection. The SNA protocol may be configured and run on top of the MPCC connection. The SNA profiles would be configured depending on the physical interface chosen and whether or not the interface was switched or nonswitched.

Communications Network Attachment

The IBM 7820 must have the appropriate physical interface module installed and configured. The physical interface must match the one selected on the RISC System/6000 system. For the V.24 and X.21 interfaces, both the IBM 7820 and the RISC System/6000 system configuration must match with respect to switched or nonswitched. For V.35, the 7820 can be configured as either switched or nonswitched.

IBM 7855 Modem

The 7855 Modem is a standalone device that provides a means for interchanging data between the RISC System/6000 system unit and a voice-grade or equivalent communication line. The 7855 Modem transmits data in duplex mode using asynchronous transmission speeds of up to 19.2 Kbps; the modem transmits in asynchronous transmission speeds of 1200 bps, 2400 bps, 4800 bps, 7200 bps, 9600 bps, and 19.2 Kbps.

The 7855 complies with CCITT V.32 and V.22 bis CCITT recommendations and Bell 212 and Bell 103 standard, making it compatible with several modems already connected to the public-switched telephone network (PSTN). The 7855 Modem is only supported in asynchronous transmission mode on the RISC System/6000 system. In asynchronous mode, the modem can use auto dialing with CCITT V.24 recommendations. The 7011 RISC System/6000 Model 220 series do not support the 7855 Modem.

RISC System/6000 Attachment

The 7855 Modem attaches to the RISC System/6000 system unit using an IBM Async Cable-EIA-232/V.24 to an IBM 8-, 16-, or 128-port EIA-232D adapter port, or a standard serial port. For non-U.S. countries, the IBM 16-Port Async Adapter-EIA-232 is not approved for modem support. For more information on the Async Cable-EIA-232/V.24, see page 1-217.

Communications Network Attachment

The 7855 Modem attaches to the communications network in the following ways:

- Direct attachment to the PSTN by way of a miniature telephone jack, type USOC-RJ11
- Attachment to the PSTN through a ROLM CBX by way of a CBX analog line that ends in an RJ11 jack
- Attachment to the PSTN through a PBX or Key Telephone System by way of an analog line that ends in a miniature telephone jack, type USOC-RJ12 or USOC-RJ13.

IBM 7861 Standalone Network Management Modem, Models 14,15, 16, 24, 25, 26, 45, 46, and 47

The 7861 Modem is a standalone device that provides a means for interchanging data between the RISC System/6000 system unit and a voice-grade or equivalent communications line. The 7861 Modem allows synchronous data transmission in half-duplex or duplex mode and contains advanced diagnostic and network management features.

The 7861 Modem has multipoint capabilities and a full-speed range from 4800 to 19,200 bps, depending on the model. The 7861 Modem also has switched network back-up features and supports Trellis-Coded Modulation (TCM).

A cable assembly facility enables you to attach multiple systems or multiple communications controllers to one 7861 Modem.

The 7861 Modem has a 2.8-m (9-ft) power cable with a nonlocking plug. A 1.8-m (6-ft) power cable is also available.

The 7861 Modem comes with a 7.5-m (25-ft) telecommunications cable that attaches the modem to the communications network.

RISC System/6000 Attachment

The 7861 Modem attaches to the RISC System/6000 system unit using an IBM Async Cable-EIA-232/V.24 to a standard serial port, an IBM 8-, 16-, or 128-port EIA-232D adapter port, an IBM 4-Port Multiprotocol Communications Controller port, or an IBM Multiprotocol Adapter/A (MP/A). For more information on the Async Cable-EIA-232/V.24, see page 1-217.

RISC System/6000 Attachment

The 7861 Modem attaches directly to the PSTN using a 7.5-m (25-ft) cable with an 8-pin keyed male modular plug.

IBM 7868 Rack-Mounted Network Management Modem, Models 24, 25, 26, 45, 46, and 47

The 7868 Modems are rack-mounted versions of the 7861 that provide a means for interchanging data between the RISC System/6000 system unit and a voice-grade or equivalent communications line. The 7868 Modem allows synchronous data transmission in half-duplex or duplex mode and contains advanced diagnostic and network management features.

The 7868 Modem has multipoint capabilities and a full-speed range from 4800 Kbps to 19200 Kbps, depending on the model. The modem also has switched network back-up features and supports Trellis-Coded Modulation (TCM).

A cable assembly facility enables you to attach multiple systems or multiple communications controllers to one IBM 7861 Modem.

The 7868 Modem has a 2.8-m (9-ft) power cable with a nonlocking plug. A 1.8-m (6-ft) power cable also is available.

The 7868 Modem comes with a 7.5-m (25-ft) telecommunications cable that attaches it to the communications network.

RISC System/6000 Attachment

The 7868 Modem must be installed in an IBM 7866, Model 001 Modem Housing. The modem housing attaches to the RISC System/6000 system unit using an IBM Async Cable-EIA-232/V.24 to a standard serial port, an IBM 8-, 16-, or 128-port EIA-232D adapter port, an IBM 4-Port Multiprotocol Communications Controller port, or an IBM Multiprotocol Adapter/A (MP/A). For more information on the Async Cable-EIA-232/V.24, see page 1-217.

Communications Network Attachment

The 7861 Modem attaches directly to the PSTN using a 7.5-m (25-ft) cable with an 8-pin keyed male modular plug.

Other Supported IBM Modems

The RISC System/6000 system unit also supports the attachment of the IBM 5865 Modem, Models 1, 2, and 3, which are no longer available through IBM.

Support for Non-IBM Modems

The RISC System/6000 system unit also supports the attachment of the following non-IBM modems:

- Hayes Smartmodems 1200, 2400, and V-Series 9600
- RacalVadic VI 1222 VP, 1200 PA, 2400 PA, VI 2422 S, 1200 VP, and 2400 VP
- Telebit Trailblazer Plus.

Digital Trunk Processors

IBM 9291 Single Digital Trunk Processor Models 10 and 20, IBM 9295 Multiple Digital Trunk Processor

The IBM Single Digital Trunk Processor and the IBM 9295 Multiple Digital Trunk Processor, in conjunction with IBM AIX DirectTalk/6000, provide high-level voice compression, high voice quality, and digital telephone signaling functions (transmit and receive). The processors use either a T1 or CEPT connection type.

The T1 digital interface uses a framed format that is channelized into 24 voice channels. The processors support a 12-frame multiframe (D4). Address signaling (commonly referred to as "interregister signaling") is supported with DTMF, multifrequency (MF), and Dial Pulse for incoming and outgoing calls.

The CEPT digital interface is channelized into 30 voice channels for signaling and synchronization. This interface supports channel-associated signaling (CAS) in the 16-frame multiframe mode per CCITT recommendations G.703, G.704 G.706, G.732. Address signaling is supported with DTMF, and Dial Plus for incoming and outgoing calls.

See page 2-47 for information on IBM AIX DirectTalk/6000.

RISC System/6000 Attachment

The 9291 and 9295 Digital Trunk Processors that attach to an IBM Trunk Adapter or IBM Digital Trunk Dual Adapter may be used in any 7011, 7012, or 7013 system unit using an external shielded cable.

Memory Expansion

In RISC System/6000 models that have 32KB of data cache, memory cards can be installed in increments of one. In RISC System/6000 models that have 64KB of data cache, memory cards must be installed in pairs (two cards with the same feature code).

For system units with POWER2 architecture, such as the 58H, 590, and 990 use memory cards as follows:

- Two cards as a pair
- Four cards of all the same feature code
- Eight cards with two sets of four, each set of four having the same feature code.

Also, any one RISC System/6000 system unit can only have all 5.0-volt memory or all 3.6-volt memory.

The data cache units in the Processor Chips Set are designed to perform error-checking and correction for memory.

Models M20, M2A, 220, 230, and 250 use PS/2 single-inline memory modules (SIMMs) that are installed directly on the base system board.

System Unit Memory Usage Summary

System Unit	4/8MB SIMMs	2/16/32 SIMMs	16MB HD3 Card	32MB HD1 Card	32MB HD3 Card	64MB HD1 Card	64MB HD3 Card	128MB HD3 Card	256MB HD3 Card
Models M20/M2A	X								
Models 220/230	X								
Model 250	X	X							
Model 34H			X		X		X	X	
Model 355			X		X		X	X	
Models 360/370			X		X		X	X	
Models 36T/37T			X		X		X	X	
Model 365			X		X		X	X	
Model 375			X		X		X	X	
Model 52H				X		X			
Model 550L			X		X		X	X	
Model 570			X		X		X	X	
Model 580			X		X		X	X	
Model 58H			X		X		X	X	X
Model 590			X		X		X	X	X
Model 970B			X		X		X	X	
Model 980B			X		X		X	X	
Model 990			X		X		X	X	X

Memory SIMM Kits for RISC System/6000 Models M20, 220, 230, and 250

The memory SIMM kits used for Models M20, 220, 230, and 250 are PS/2 SIMMs mounted directly on the base system board. These SIMMs are different from the ones used on other RISC System/6000 system units. The SIMMs used are standard 36-bit 5-volt PS/2 SIMMs with 70-ns modules.

- Models M20, 220, and 230
 - 4/8MB SIMMs
 - Installed in pairs
- Model 250
 - 4/8MB SIMMs
 - 2/16/32MB SIMMs
 - Installed in sets of four

IBM 16MB HD3 High-Density Memory Card

The 16MB HD3 High-Density Memory Card provides 16MB memory upgrade capability.

- 85-ns 2 megabit DRAM modules
- 3.6-volt memory card
- 5.0-volt SIMMS.

See page 1-107 for information on which system units use this card.

IBM 32MB HD1 High-Density Memory Card

The 32MB HD1 High-Density Memory Card provides 32MB memory upgrade capability.

- 80-ns 4 megabit DRAM modules
- 5.0-volt memory card
- 5.0-volt SIMMS.

See page 1-107 for information on which system units use this card.

IBM 32MB HD3 High-Density Memory Card

The 32MB HD3 High-Density Memory Card provides 32MB memory upgrade capability.

- 80-ns 4 megabit DRAM modules
- 3.6-volt memory card
- 5.0-volt SIMMS.

See page 1-107 for information on which system units use this card.

IBM 64MB HD1 High-Density Memory Card

The 64MB HD1 High-Density Memory Card provides 64MB memory upgrade capability.

- 80-ns 4 megabit DRAM modules
- 5.0-volt memory card
- 5.0-volt SIMMS.

See page 1-107 for information on which system units use this card.

IBM 64MB HD3 High-Density Memory Card

The 64MB HD3 High-Density Memory Card provides 64MB memory upgrade capability.

- 80-ns 4 megabit DRAM modules
- 3.6-volt memory card
- 5.0-volt SIMMS.

See page 1-107 for information on which system units use this card.

IBM 128MB HD3 High-Density Memory Card

The 128MB HD3 High-Density Memory Card provides 128MB memory upgrade capability.

- 60-ns 16 megabit DRAM modules
- 3.6-volt memory card
- 5.0-volt SIMMS.

See page 1-107 of this manual or information on which system units use this card.

IBM 256MB HD4 High-Density Memory Card

The 256MB HD4 High-Density Memory Card provides 256MB memory upgrade capability.

- 60-ns 16 megabit DRAM modules
- 3.6-volt memory card
- 5.0-volt SIMMS.

See page 1-107 of this manual or information on which system units use this card.

Memory SIMM Kits for RISC System/6000 Memory Cards

The memory Single In-line Memory Module (SIMM) kits can be added to installed memory cards. They provide a lower cost alternative to the replacement of the entire memory cards. The candidate memory cards Engineering Change (EC) level needs to be at an acceptable level for SIMM kit installation.

The following models are candidates for upgrading using the 32MB SIMM kits:

- MT 7012 34H, 350, 360, 370, 355, 365, 375
- MT 7013 53E, 53H, 55E, 55S, 550, 560, 56F, 570, 57F, 58F, 58H, 590
- MT 7015 95E, 970, 970B, 97E, 97F, 980, 980B, 98E, 98F, 990

The following models are candidates for upgrading using the 64MB SIMM kits:

- MT 7012 34H, 350, 360, 370, 355, 365, 375, 320, 32E, 32H
- MT 7013 520, 52H, 53E, 55E, 530, 53H, 550, 55S, 56F, 570, 550L, 57F, 58F, 58H, 590
- MT 7015 930, 95E, 970, 970B, 97E, 97F, 980, 980B, 98E, 98F, 990

The following models are candidates for upgrading using the 128MB SIMM kit:

- MT 7012 34H, 350, 360, 370, 355, 365, 375
- MT 7013 550, 55E, 55S, 56F, 570, 57F, 580, 58F, 550L, 58H, 590
- MT 7015 95E, 970, 970B, 97E, 97F, 980, 980B, 98E, 98F, 990

Communications Adapters, Cable Assemblies, and Other Related Products

The following communications adapters and associated cable assemblies (interface cables) are available for use with the RISC System/6000 system.

IBM 8-Port Async Adapter-EIA-232

The 8-Port Async Adapter-EIA-232 provides support for attaching a maximum of eight EIA-232D asynchronous serial devices (such as modems, terminals, and printers) to a RISC System/6000 system unit. The optional IBM Multiport Interface Cable connects to the adapter and provides the eight connectors for device attachment.

The adapter has the following features:

- Eight asynchronous ports, each with a data interchange rate of up to 38.4 Kbps
- One 78-pin female D-shell connector (interface cable attaches to this connector)
- Support for cable lengths of up to 61 m (200 ft) (provided the cable does not exceed a load capacitance of 2500 pico-farads)
- 16-byte buffering on transmit and receive operations
- Approved for international use under CCITT specifications V.24/V.28 Series 100
- Full set of modem control lines
- Compatibility with EIA-232D requirements
- Micro Channel features:
 - I/O slave
 - 16-bit data and address widths
 - Support for data and address parity
 - Machine-readable vital product data (VPD)
 - Type 3 adapter card size.
- Wrap plug for 78-pin connector (supplied for testing).

Each port can be configured for the following baud rates: 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, and 38400 bps.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM 8-Port Async Adapter-EIA-422A

The 8-Port Async Adapter-EIA-422A provides support for attaching a maximum of eight EIA-422A asynchronous serial devices (such as terminals and printers) to a RISC System/6000 system unit. The optional IBM Multiport Interface Cable connects to the adapter and provides eight connectors for device attachment. RISC System/6000 EIA-422A adapters support only indoor operation.

The adapter has the following features:

- Eight asynchronous ports, each with a data interchange rate of up to 38.4 Kbps
- One 78-pin female D-shell connector (interface cable attaches to this connector)
- Support for cable lengths up to 1220 m (4000 ft)
- Built-in surge protection circuitry
- 16-byte buffering on transmit and receive
- Compatibility with EIA-422A requirements
- Micro Channel features:
 - I/O slave

- 16-bit data and address widths
- Support for data and address parity
- Machine-readable vital product data (VPD)
- Type-3 adapter-card size
- Wrap plug for 78-pin connector (supplied for testing).

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM 8-Port Async Adapter-MIL-STD 188

The 8-Port Async Adapter-MIL-STD 188 provides support for attaching a maximum of eight MIL-STD 188-114 asynchronous serial devices (such as modems, terminals, and printers) to a RISC System/6000 system unit. The optional IBM Multiport Interface Cable connects to the 8-Port Async Adapter-MIL-STD 188 and provides eight connectors for device attachment.

The 8-Port Async Adapter-MIL-STD 188 features the following:

- Eight asynchronous ports, each with a data interchange rate of up to 38.4 Kbps
- One 78-pin female D-shell output connector (cable attaches to this connector)
- Eight signal/control wires per port
- 16-byte buffering on transmit and receive operations
- Compatibility with the MIL-STD 188-114 requirements
- Full set of modem control lines
- Micro Channel features:
 - I/O slave
 - 16-bit data and address widths
 - Support for data and address parity
 - Machine-readable vital product data (VPD)
 - Type-3 adapter-card size.
- Wrap plug for 78-pin connector (supplied for testing).

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM Multiport Interface Cable

The Multiport Interface Cable allows attachment of up to eight separate devices to any of the three IBM 8-port asynchronous adapters. An adapter can only be used with one interface cable; no sharing is supported. The interface cable features eight 25-pin male D-shell connectors. A wrap plug is supplied for testing.

RISC System/6000 Attachment

The interface cable connects to the 8-port adapter using a 3-m (10-ft) cable with a 78-pin male D-shell connector.

IBM 16-Port Async Adapter-EIA-232

The 16-Port Async Adapter-EIA-232 provides support for attaching a maximum of 16 EIA-232D asynchronous serial devices (such as terminals and printers) to a RISC System/6000 system unit.

The adapter contains all of the electronics required to support 16 asynchronous ports. All 16 ports exit the card on a single 78-pin female D-shell connector. This connector attaches to the optional IBM 16-Port Interface Cable-EIA-232.

The adapter features the following:

- 16 asynchronous ports, each with data interchange rate of up to 38.4 Kbps
- Support for cable lengths of up to 61 m (200 ft) (provided the cable does not exceed a load capacitance of 2500 pico-farads)
- 16-byte buffering on transmit and receive operations
- Compatibility with EIA-232D requirements
- Micro Channel features:
 - I/O slave
 - 16-bit data and address widths
 - Support for data and address parity
 - Machine-readable vital product data (VPD)
 - Type-3 adapter-card size.
- Wrap plug for 78-pin connector (supplied for testing).

The adapter supports the following signal lines: RxD, TxD, DTR, DCD, and RTS (RTS always high). For non-U.S. countries, this adapter is not approved for modem support.

Each port can be configured for the following baud rates: 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, and 38400 bps.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM 16-Port Interface Cable-EIA-232

The 16-Port Interface Cable allows attachment of up to 16 separate devices to an IBM 16-Port Async Adapter-EIA-232. An adapter can only be used with one interface cable; no sharing is supported.

The interface cable features sixteen 25-pin male D-shell connectors. A wrap plug is supplied for testing.

RISC System/6000 Attachment

The interface cable connects to the 16-Port Async Adapter-EIA-232 port using a 3-m (10-ft) cable with a 78-pin male D-shell connector.

IBM 16-Port Async Adapter-EIA-422A

The 16-Port Async Adapter-EIA-422A provides support for attaching a maximum of 16 EIA-422A asynchronous serial devices (such as terminals and printers) to a RISC System/6000 system unit.

The adapter contains all of the electronics required to support 16 asynchronous ports. All 16 ports exit the card on a single 78-pin female D-shell connector. This connector attaches to the optional IBM 16-Port Interface Cable-EIA-422A. RISC System/6000 EIA-422A adapters support only indoor operation.

The 16-Port Async Adapter-EIA-422A has the following features:

- 16 asynchronous ports, each with a data interchange rate of up to 38.4 Kbps
- Support for cable lengths of up to 1200 m (4000 ft)
- Built-in surge protection circuitry on the adapter
- 16-byte buffering on transmit and receive operations
- Compatibility with the EIA-422A requirements
- Micro Channel features:
 - I/O slave
 - 16-bit data and address widths
 - Support for data and address parity
 - Machine-readable vital product data (VPD)
 - Type-3 adapter-card size.
- Wrap plug for 78-pin connector (supplied for testing).

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM 16-Port Interface Cable-EIA-422A

The 16-Port Interface Cable-EIA-422A allows up to 16 separate devices to be attached to an IBM 16-Port Async Adapter-EIA-422A. An adapter can only be used with one interface cable; no sharing is supported.

The interface cable features sixteen 25-pin male D-shell connectors. A wrap plug is supplied for testing.

RISC System/6000 Attachment

The interface cable connects to the 16-Port Async Adapter-EIA-422A using a 3-m (10-ft) cable with a 78-pin male D-shell connector.

IBM 128-Port Async Controller

The 128-Port Async Controller provides support for attaching a maximum of 128 EIA-232D asynchronous serial devices (such as terminals, modems, and printers) to a RISC System/6000 system unit, when used with one or more optional IBM Remote Async Node 16-Port EIX-232.

The controller features the following:

- Support for direct or synchronous modem to attach remote async nodes
- Attachment of up to eight Remote Async Nodes
- Two 15-pin female high-density D-shell connectors
- 512KB memory
- Micro Channel features:
 - Memory slave
 - 16-bit data width
 - 24-bit address width
 - Machine-readable vital product data (VPD)
 - Type-3 adapter-card size.
- Controller line terminators (two included, required for operation)
- Async wrap plug (supplied for testing).

RISC System/6000 Attachment

The 128-Port Async Controller requires a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM Remote Async Node 16-Port EIA-232

The Remote Async Node is an intelligent interface device for use with the IBM 128-Port Async Controller and has the following features:

- 16 asynchronous ports, each with a data interchange rate of up to 57.6 Kbps
- Support for cable lengths of up to 61 m (200 ft) (provided the cable does not exceed a load capacitance of 2500 pico-farads)
- Compatibility with EIA-232D requirements
- Full set of modem control signals
- External power supply
- Machine-readable vital product data (VPD)
- Character processing capability.

RISC System/6000 Attachment

The Remote Async Node connects to the controller using a variety of attachment options, including 4-wire and 8-wire direct cabling, as well as EIA-232 and EIA-422 synchronous modems. For more information on options, see page 1-216.

IBM X.25 Interface Co-Processor/2

The X.25 Interface Co-Processor/2 provides support for attaching a RISC System/6000 system unit to an X.25 network. The adapter provides a single port that can accommodate three selectable interfaces: X.21, EIA-232D/V.24 and V.35. The port has a 37-pin female D-shell connector.

The X.25 Interface Co-Processor/2 features the following:

- 512KB memory
- Full-duplex synchronous protocol
- Approved to support the following interfaces in other countries:
 - X.21 interface at up to 64 Kbps
 - EIA-232D/V.24 interface at 19.2 Kbps
 - V.35 interface at 56 Kbps.
- Leased line
- Micro Channel features:
 - I/O slave
 - 16-bit data width
 - 24-bit address width
 - Type 3 adapter card size.
- Wrap plug for 37-pin connector (supplied for testing).

This adapter allows a RISC System/6000 system unit to attach to X.25 networks and is capable of processing inbound and outbound data streams to off load communications tasks from the system processor.

Six separate cable lengths are optionally available with the adapter (two for each interface). For more information on the cables mentioned, see "Cables and Cable Assemblies" on page 1-216.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM Realtime Interface Co-Processor Multiport/2 Adapter/A

The IBM Realtime Interface Co-Processor Multiport/2 Adapter is an intelligent microprocessor-based adapter capable of handling a variety of communications protocols.

An Electronic Interface Board (EIB) must be selected with the Multiport/2 adapter. The EIBs have drivers, receivers, and some logic to implement one or more specific communications physical interfaces. Together, a Multiport/2 adapter and an EIB make a complete intelligent-communications interface.

The IBM Realtime Interface Co-Processor Multiport/2 Adapter includes real-time control licensed internal code, which allows a software developer to write device drivers and application tasks that perform intelligent communications operations.

Available for use with this adapter is the IBM Realtime Interface Co-Processor AIX Support for RISC System/6000. The customer can use this device driver (FC5696-038) and customer-supplied microcode and application software.

The Multiport/2 adapter features the following:

- Advanced high-performance Intel 80186 microprocessor
- Up to 1MB of dual-ported co-processor memory with parity for error detection
- 8-bit mode and 16-bit mode data bus support
- Zilog(2) 80C30 Serial Communications Controller
- CRC generation and checking
- Eight programmable hardware timers
- Watchdog timer and status indicator
- IBM Realtime Interface Co-Processor Installation and Service Manual
- Real-time Control Program licensed internal code
- Read-only-memory (ROM)-based automatic power on self-test of Co-processor components
- ROM-based I/O utility routines
- ROM-based bootstrap loader
- 78-pin connector (wrap plug supplied for testing)
- Licensed internal code support of up to 248 concurrent tasks running on the co-processor adapter
- Multiport/2 interface cable for convenient external cable connection.

Note: Cables are not supported for outdoor operation.

Two Multiport/2 base cards are available:

- Multiport/2 with 512KB memory
- Multiport/2 with 1MB memory.

The EIBs contain the line drivers and receivers to provide the physical interface logic levels (RS-232 and RS-422). Five EIBs are available:

- 4-Port EIA-232-C
- 8-Port EIA-232-C
- 4-Port EIA-232-C/4-Port EIA-422-A
- 6-Port Synchronous EIA-232-C
- 8-Port EIA-422-A.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. The EIB has a 78-pin female D-shell connector, which provides connection to a device interface breakout box with cable. For information on which system units can use this adapter, see page 1-141.

4-Port EIA-232-C Multiport/2 Co-Processor Adapter/A

The adapter consists of a Multiport/2 base card and a separately orderable 4-Port EIA-RS-232-C EIB.

The 4-port EIA-232-C co-processor adapter has the following features:

- Operation on up to four ports concurrently at 9.6 Kbps
- Data rates up to 19.2 Kbps, full duplex, ASYNC, on ports 0 and 1
- Data rates up to 38.4 Kbps, full duplex, HDLC/SDLC, on ports 0 and 1.
- Interface cable available for external connection.

8-Port EIA-232-C Multiport/2 Co-Processor Adapter/A

The adapter consists of a Multiport/2 base card and a separately orderable 8-port EIA-232-C EIB. The 8-port EIA-232-C co-processor adapter has the following features:

- Operation on up to eight ports concurrently at 9.6 Kbps
- Data rates up to 19.2 Kbps, full duplex, ASYNC, on ports 0 and 1
- Data rates up to 38.4 Kbps, full duplex, HDLC/SDLC, on ports 0 and 1.
- Interface cable available for external connection

4-Port EIA-232-C/4-Port EIA-422-A Multiport/2 Co-Processor Adapter/A

The adapter consists of a Multiport/2 base card and a separately orderable 4-port EIA-232-C/4-Port EIA-422-A EIB. The 4-port EIA-232D/4-Port EIA-422-A co-processor adapter has the following features:

- Operation on up to eight ports concurrently at 9.6 Kbps
- Data rates up to 19.2 Kbps, full duplex, ASYNC, on ports 0 and 1
- Data rates up to 38.4 Kbps, full duplex, HDLC/SDLC, on ports 0 and 1.
- Interface cable available for external connection

6-Port Synchronous EIA-232-C Multiport/2 Co-Processor Adapter/A

The adapter consists of a Multiport/2 base card and a separately orderable 6-port EIA-232-C EIB. The 6-port EIA-232-C co-processor adapter has the following features:

- Data rates up to 38.4 Kbps, full duplex, HDLC/SDLC, on one of the first two ports; a second port supports speeds up to 19.2 Kbps, full duplex
- Operation on up to six ports concurrently at 4.8 Kbps full duplex, HDLC/SDLC, or 9.6 Kbps full duplex, ASYNC.
- Interface cable available for external connection.

8-Port EIA-422-A Multiport/2 Co-Processor Adapter/A

The adapter consists of a Multiport/2 base card and a separately orderable 8-port EIA-422-A EIB. The 8-port EIA-422-A co-processor adapter has the following features:

- 9.8 Kbps on eight ports concurrently, full duplex
- Interface cable available for external connection.
- 64 Kbps, full duplex, first port.

IBM Realtime Interface Co-Processor Portmaster Adapter/A

The IBM Realtime Interface Co-Processor Portmaster Adapter/A is an intelligent microprocessor-based adapter capable of handling a variety of communications protocols.

An Electronic Interface Board (EIB) must be selected with the Portmaster Adapter/A. The EIBs have drivers, receivers, and some logic to implement one or more specific communications physical interfaces. Together, a Portmaster Adapter/A and an EIB make a complete intelligent-communications interface.

The Portmaster is a Micro Channel bus master co-processor. Bus master extensions include capabilities and services to address adapter-to-system and adapter-to-adapter data transfers using the bus master capability. Available for use with this adapter is the IBM Realtime Interface Co-Processor AIX Support for RISC System/6000. The customer can use this device driver (FC5696-038) and customer-supplied microcode and application software. The Portmaster adapter features the following:

- 12.5 MHz Intel 80C186 microprocessor
- Up to 2MB on-board user memory
- Up to eight serial input/output ports available through a family of interface boards and cables
- Real time, multitasking kernel.
- 100-pin wrap plug (for testing).
- Software-selectable configuration option
- Up to 255 software timers.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. The EIB has a 100-pin position D-shell connector, which provides connection to a device interface breakout box cable. For information on which system units can use this adapter, see page 1-141.

Two Portmaster base cards are available:

- Portmaster with 1MB memory
- Portmaster with 2MB memory

The EIBs contain the line drivers and receivers to provide the physical interface logic levels (RS-232 and RS-422). Four EIB's are available:

- 8-Port EIA-232-D
- 8-Port RS-422-A
- 6-Port V.35
- 6-Port X.21.

8-Port EIA-232-D Portmaster Adapter/A

The adapter consists of the Portmaster base card and the separately orderable 8-port EIA-232-D EIB. The 8-port EIA-232 co-processor adapter has the following features:

- Operation on up to eight ports concurrently up to 38.4 Kbps, full duplex
- 8-Port Interface Cable for external cable connection.
- Asynchronous/synchronous protocols – Ports 0-7.

8-Port RS-422-A Portmaster Adapter/A

The adapter consists of a Portmaster base card and the separately orderable 8-port RS-422A EIB. The 8-port RS-422-A co-processor adapter has the following features:

- RS-422-A operation on up to eight ports concurrently, full duplex at 64 Kbps
- Single-port RS-422 data rate up to 2.048 Mbps, full duplex (at data rates above 1 Mbps, the polarity of the transmit clock signal (STA and STB) should be reversed)

- Dual-port X.21 data rates on ports 0 and 1, running concurrently at 64 Kbps
- Eight-port interface cable for external cable connection.

6-Port V.35 Portmaster Adapter/A

The adapter consists of a Portmaster base card and the separately orderable 6-port V.35 EIB. The 6-port V.35 co-processor adapter has the following features:

- Operation on up to six parts concurrently
- Single-port data rate up to 2.048 Mbps, full duplex
- Six-port interface cable for external cable connection.

6-Port X.21 Portmaster Adapter/A

The adapter consists of a Portmaster base card and the separately orderable 6-port X.21 EIB. The 6-port X.21 co-processor adapter has the following features:

- Operation on up to six parts concurrently
- Single-port data rate up to 2.048 Mbps, full duplex
- Six-port interface cable for external cable connection.

IBM 4-Port Multiprotocol Communications Controller

The 4-Port Multiprotocol Communications Controller attaches a RISC System/6000 system unit to synchronous communications networks using EIA-232D/V.24, EIA-422A, V.35, or X.21 physical interfaces. The adapter only supports indoor operation on the EIA-422A interface.

The adapter consists of a base card and a daughter card. The two cards are physically connected and require a single Micro Channel adapter slot.

The base card prepares all inbound and outbound data, performs address searches, and in general relieves the system processor of many communications tasks. This adapter supports bit-synchronous, character-synchronous, and asynchronous protocols when appropriately programmed with loadable application software. Not all of the features of the 4-Port Multiprotocol Communications Controller are supported by the RISC System/6000 software.

The daughter card supports four interfaces: EIA 232D/V.24 on Ports 0 to 3, EIA 422A on Ports 0 and 2, CCITT X.21 on Port 0, and CCITT V.35 on Ports 0 and 1. It also provides drivers, receivers, and surge protection. Surge protection is provided only on the EIA-422A interface on Port 2. The EIA-422A interface on Port 0 is designed to operate using synchronous protocols with attachment cables less than 25 m (82.5 ft).

Devices are attached to the adapter using an IBM 4-Port Multiprotocol Interface Cable, which connects to the daughter card.

The adapter features the following:

- Supports four ports concurrently
- 512KB memory
- 16-bit DMA data transfer width
- Two selectable interrupt levels
- Approved to support the following interfaces in other countries:
 - EIA-232D/V.24
 - V.35
 - X.21
- CRC generation and checking
- Micro Channel features:
 - Memory and I/O slave
 - 16-bit data width

- 32-bit address width
- Type-3-adapter-card size
- Support for Realtime Control licensed internal code which, in conjunction with the adapter, allows a software developer to write device drivers and applications tasks that perform intelligent communications operations
- Wrap plug for 78-pin connector (supplied for testing).

RISC System/6000 Attachment

The controller fits into any Micro Channel adapter slot.

Also, the adapter has a 78-pin female D-shell connector to attach to the 4-Port Multiprotocol Interface Cable, which provides device connections. Each adapter can support only one interface cable; no sharing is supported.

For information on which system units can use this adapter, see page 1-141.

IBM 4-Port Multiprotocol Interface Cable

The 4-Port Multiprotocol Interface Cable provides an interface cable for the IBM 4-Port Multiprotocol Communications Controller. The four port connectors are as follows:

- Four 25-pin male connectors for EIA-232D/V.24
- Two 15-pin male connectors for V.35
- One 15-pin male connectors for X.21
- Two 25-pin male connectors for EIA-422A.

The four ports can be configured as follows:

Port 0	EIA-232D/V.24, EIA-422A, V.35, or X.21
Port 1	EIA-232D/V.24 or V.35
Port 2	EIA-232D/V.24 or EIA-422A
Port 3	EIA-232D/V.24 only.

Wrap plugs are supplied for all four interfaces.

For more information on the interface cable, see page 1-216.

RISC System/6000 Attachment

The interface cable connects to the 4-Port Multiprotocol Communications Controller using a 3-m (10-ft) cable with a 78-pin male D-shell connector.

IBM Multiprotocol Adapter/A (MP/A)

The Multiprotocol Adapter/A (MP/A) provides RISC System/6000 systems with a one-port SDLC connection to SDLC protocol communications networks. The MP/A supports modems or direct attachment at speeds up to 19.2 Kbps

The Multiprotocol Adapter/A features the following:

- Supports one port
- EIA-232D Interface
- EIA-232 distance supported – 50 feet
- External Interface Speed – 19.2 Kbps (maximum)
- Supports the following interface signals: Tx, Rx, RTS, CTS, DTR, DSR, DCD, RI, TxCLK, RxCLK and HRSI
- Standard Micro Channel form-factor card (Type 3)
- Maximum of two adapters per system.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which systems can use this adapter, see page 1-141.

IBM Token-Ring High-Performance Network Adapter

The Token-Ring High-Performance Network Adapter is a high-performance Micro Channel bus master DMA adapter used to attach the RISC System/6000 system unit to either a 4 Mbps or a 16 Mbps Token-Ring local area network.

This adapter supports high-performance applications. The Token-Ring High-Performance Network Adapter is cable- and network-compatible with existing Token-Ring adapters, so no new cables or network components are required. All adapters on a Token-Ring network must operate at the same speed.

To attach the RISC System/6000 to the network for connection to shielded twisted-pair wire, the customer only has to supply an appropriate STP cable.

To attach the RISC System/6000 to the network for connection to unshielded twisted-pair wire, the customer has to supply a cable that converts from the 9-pin D-shell connector to an RJ-45 connector.

The adapter features the following:

- IEEE 802.5 compatibility
- Eight Address/Interrupt states supported
- Adapter cable supplied to connect to an IBM cabling-system socket or to an IBM 8228 Multi-Station-Access Unit socket
- Micro Channel features:
 - Bus master
 - I/O slave
 - 16-bit data width
 - 24-bit address width
 - Support for data and address parity
 - Support for streaming data (only as a DMA bus master)
 - Machine-readable Vital Product Data (VPD)
 - Type-3-adapter-card size
- One 9-pin female D-shell connector for attachment to the Token-Ring network.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM Ethernet High-Performance LAN Adapter

The Ethernet High-Performance LAN Adapter is a high-performance Micro Channel bus master DMA adapter that allows the RISC System/6000 system unit to attach to an Ethernet network.

The adapter is designed to provide a connection to a 10 Mbps Carrier Sense Multiple Access/Collision Detection (CSMA/CD) Ethernet network.

To attach the RISC System/6000 system unit to the network for connection to the standard 50-ohm (thick) coaxial cable, the customer must supply the appropriate cable and order an external transceiver. To attach the system unit to the network for connection to RG-58A/U (thin) coaxial cable, the customer only has to supply an appropriate cable and "T" connector. The transceiver is included with the adapter.

To attach the system unit to the network for connection to unshielded twisted-pair (UTP) wire, the customer must order an IBM 10BaseT transceiver (FC 4224 or equivalent).

The adapter features the following:

- IEEE 802.3 or Ethernet Version 2 compatibility
- 2 Connectors
 - BNC (Thin)
 - AUI (Thick)

Note: Only one connector is active at a time; do not attach cables to both connectors.

- 16KB of memory for data buffering
- Selectable interrupt levels
- Timer interrupt
- Selectable memory addresses
- 32-bit cyclic redundancy check
- Micro Channel features:
 - Bus master
 - Memory and I/O slave
 - 32-bit data and address widths
 - Support for data and address parity
 - Machine-readable vital product data (VPD)
 - Type-3-adapter-card size.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM 3270 Connection Adapter

The 3270 Connection Adapter allows a RISC System/6000 system unit to connect to a System/370 host. This adapter allows a coaxial connection between a system unit and any of the following: a 3174 or 3274 Display Control Unit, an integrated workstation adapter of the IBM 4331 or 4361 processors, or the workstation subsystem controller of the IBM 9370 processor. The 3270 connection adapter for the RISC System/6000 system unit is the same adapter as the 3270 Connection Adapter/A for the PS/2 system.

The adapter features the following:

- Support for CUT and DFT modes of operation
- 2 Mbps maximum data transfer rate
- One female BNC connector provided
- Micro Channel features:
 - I/O slave
 - 16-bit data and address widths
 - Type-3-adapter-card size.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM System/370 Host Interface Adapter

The System/370 Host Interface Adapter allows the RISC System/6000 system units to attach to either the IBM 5088 or IBM 6098 Graphics Control Unit. This adapter is physically identical to the 5085 and 5086 Attachment Adapters but has different licensed internal code loaded on it. The adapter runs in secondary mode.

The adapter features the following:

- 64KB memory buffers
- Link speed of up to 2 Mbps
- 16 link addresses
- Micro Channel features:
 - Bus master
 - Memory and I/O slave
 - 16-bit data width
 - 24-bit address width
 - Support for data and address parity
 - Requires bus refresh
 - Machine-readable vital product data (VPD)
 - Type 5 adapter card size.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM Fiber Distributed Data Interface (FDDI) Fiber Adapter

The IBM FDDI Fiber Adapter allows a RISC System/6000 system unit to interface with a Fiber Distributed Data Interface network. The base adapter allows communications on a Single-Attach Station (SAS) network, while the optional upgrade allows communications on a Dual-Attach Station (DAS) network.

Two types of FDDI Adapters are available. One supports fiber optic media called IBM FDDI-Fiber Adapter. The second supports shielded twisted-pair media called IBM FDDI-STP Adapter.

The adapter is compatible with the following protocol standards:

- ANSI X3.139 FDDI Token-Ring Media Access Control (MAC)
- X3T9/84-48 FDDI Physical Layer Medium Dependent (PMD) – for fiber interface
- X3T9/83-15 FDDI Physical Layer Protocol (PHY)
- X3T9.5/84-49 FDDI Station Management (SMT)
- ANSI/IEEE 802.2-1985 Local Area Networks: Logical Link Control (in system software).

The FDDI adapter set features the following:

- Data rate of up to 100 Mbps
- 4B/5B encoding of data for transmission
- 320C25 Microprocessor
- Micro Channel features:
 - Bus master
 - Memory and I/O slave
 - 32-bit data width
 - 32-bit address width
 - Support for data and address parity
 - Machine-readable Vital Product Data (VPD)
 - Type-3-adapter-card size (SAS or DAS upgrade).

RISC System/6000 Attachment

The standard adapter fits into any Micro Channel adapter slot. The optional upgrade requires an additional slot.

For information on which system units can use this adapter, see page 1-141.

IBM Serial Optical Channel Converter

The Serial Optical Channel Converter facilitates high-speed network connectivity between RISC System/6000 system units and between a RISC System/6000 system and high-performance heterogeneous networks. The network communications are in conjunction with an external router from the Network Systems Corporation (NSC) Data Exchange (DX) series of network controllers.

Each converter supports two serial optic ports. The ports, which are independent of each other, can run in half-duplex, or dual simplex mode. A single fiber-optic cable connects to each port, and each cable consists of two fibers, transmit and receive. Actual throughput depends on factors such as user applications and system environments.

The converter uses short wave (780nm) CD lasers and functions with both 50/125 um and 62.5/125 um multimode fibers.

Contact your IBM representative for more information on the NSC router.

RISC System/6000 Attachment

The converter plugs into the processor system board, where the Serial Optical Channel resides.

For information on which system units can use this adapter, see page 1-141.

IBM 4033 LAN Connection for Printers and Plotters

The IBM 4033 LAN Connection for Printers and Plotters is a product that allows printers or plotters or both to be directly connected to either a Token-Ring or Ethernet LAN. The IBM 4033 supports all RISC System/6000 printers and plotters that attach using either a parallel or serial EIA-232D interface. See page 1-58 and page 1-73 for information on printers and plotters supported by the RISC System/6000 system.

The adapter supports the printing functions and options of the AIX for RISC System/6000 print queue subsystem, and includes the software necessary for installation and operation on the RISC System/6000.

Three models are available:

- Model 1 supports a Token-Ring LAN connection, at either 4 Mbps or 16 Mbps.
- Model 2 supports an Ethernet (IEEE 802.3) twisted-pair connection, at 10 Mbps.
- Model 3 supports an Ethernet (IEEE 802.3) thick or thin connection, at 10 Mbps.

Attachment

The self-contained 4033 LAN adapter attaches to the serial or parallel port of the printer or plotter. It attaches to the Token-Ring LAN using a PC Adapter Cable or to an Ethernet LAN using either a customer-supplied attachment-unit-interface (AUI) cable (thick) or a BNC T-connector to the standard RG-58AU coaxial cable (thin).

Channel Attachments

IBM System/370 Block Multiplexer Channel Adapter

The IBM System/370 Block Multiplexer Channel Adapter enables data transfers between a RISC System/6000 system unit and a System/370 or System/390. The RISC System/6000 is defined as a System/370 control unit.

The adapter connects to a block-multiplexer channel that conforms to the IBM System/360 and *System/370 I/O Interface Channel to Control Unit Original Equipment Manufacturers' Information (OEMI)* (GA22-6974).

The following System/370 processors are supported:

- 9021
- 9121
- 9221
- 3090
- 308X
- 4381

The 3044 Model 2 Channel Extender and the 9034 ESCON Converter are also supported.

The adapter features the following:

- Data transfer rate of up to 4.5 MBps
- Support for two adapters per system unit
- Programmable Option Select (POS) registers, which allow dynamic configuration during the setup cycle
- 36-bit-wide shared data RAM
- 18-bit-wide instruction RAM
- Micro Channel features:
 - Memory I/O slave
 - 32-bit data width
 - 32-bit address width
 - Support for data and address parity
 - Machine-readable vital product data (VPD)
 - Type-3-adapter card size.

Note: With two adapters communicating to the same host in XA or ESA mode, multipath mode is not supported.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM System/390 ESCON Channel Adapter

The IBM System/390 Enterprise System Connection (ESCON) Channel Adapter enables data transfers between a RISC System/6000 system unit and a System/390. The RISC System/6000 acts as a System/390 ESCON control unit.

The adapter connects to an IBM ESCON channel that conforms to the interface described in *IBM Enterprise Systems Architecture/390 ESCON I/O Interface* (SA22-7202).

The following System/390 processors are supported:

- 9021
- 9121

- 9221
- 3090 Model J

The 9032 and 9033 ESCON directors are also supported.

The adapter features the following:

- Data transfer rate of up to 17 MB per second
- Support for two adapters per system unit
- Programmable Option Select (POS) registers, which allow dynamic configuration during the setup cycle
- Micro Channel features:
 - Master and slave capability
 - 40MB streaming
 - 16/32 bit data widths
 - Support for data and address parity
 - Machine-readable vital product data (VPD)
 - Two Type-5 adapter cards.

Note: With two adapters communicating to the same host, multipath mode is not supported.

RISC System/6000 Attachment

This adapter is only supported in RISC System/6000 systems with 16MB or more of system memory. The adapter fits into two adjacent Micro Channel adapter slots. For information on which system units can use this adapter, see page 1-141.

IBM High Performance Parallel Interface (HIPPI) Channel Attachment

The IBM HIPPI Micro Channel adapter set enables the IBM RISC System/6000 to be attached to the industry-standard High Performance Parallel Interface (HIPPI) channel as defined by ANSI. The adapter is fully compliant with the following ANSI standards and draft proposed standards:

- HIPPI-PH (Physical Layer) ANSI standard X3.183–1991
- HIPPI-FP (Framing Protocol) ANSI X3.210–1992
- HIPPI-LE (802.2 Link Encapsulation) ANSI X3.218–1993
- HIPPI-SC (Switch Control) ANSI X3.222–1993

Features

The HIPPI adapter set features include:

- Micro Channel features
 - First party bus master for DMA
 - 64-bit-wide data streaming
 - support for address and data parity
 - Three type-5 adapter cards
- 1MB each HIPPI transmit and receive data RAMs
- 256KB execution RAM for the on board I960 microprocessor
- Sustained data transfer rates of up to 66MBps
- Support for one adapter per Micro Channel.

The IBM RISC System/6000 HIPPI channel features are:

- 32-bit-wide data transfer with parity
- 100MBps burst rate
- Support for up to 25 meter copper cable, extendable by vendor fiber optic units
- Support for HIPPI switches made by third party vendors.

The adapter can be used for either communications or storage channel applications. The adapter and associated AIX 3.2 device drivers support the following HIPPI upper level protocols:

- IPI-3 master mode (first and third party)
- IPI-3 slave mode (first and third party)
- TCP/UDP/IP protocols and BSD socket interfaces.

With the IPI-3 master mode driver many HIPPI storage devices can be attached, including the IBM 9570 Disk Array Subsystem or equivalent, and 19-mm tape drive units. The IPI-3 slave mode driver allows the user to write an application to emulate IPI-3 HIPPI devices. Using both the IPI-3 master and slave mode drivers, the RISC System/6000 may act as a third-party storage server or client, or several RISC System/6000 processors may be attached together to do cluster computing over IPI-3 and HIPPI.

With the IP and related upper level protocols, all services and applications that normally take advantage of TCP, UDP, IP or their socket-based interfaces, will work with the HIPPI adapter also.

RISC System/6000 Attachment

The HIPPI card set has three cards with Top Card Crossover Cables. The fourth and fifth card slots are required for this adapter. The fourth (empty) card slot is to be left next to the exposed component side of the adapter set. To meet power per Micro Channel slot and cooling requirements, the 7015 Models 970B, 980B and 990 support one channel attachment on each eight slots or XIO module.

This adapter set is only supported on select models of the RISC System/6000 with 32MB or more of memory.

IBM S/370 Channel Emulator/A

The IBM S/370 Channel Emulator/A is an adapter which allows connection to the RISC System/6000 of devices through the System/370 parallel channel architecture, as described in the *IBM System/360 and System/370 I/O Interface Channel to Control Unit OEMI* (GA22-6974). This supports the 3480, 3490, and 3490E tape subsystems, and the 3494 and 3495 tape library dataservers. Also, printers including the 3825, 3827, 3828, 3831 in 3835 compatibility mode, 3835 models 1 and 2, and 3900 are supported. (Software for printer support is obtained from Pennant Systems and software for tape subsystem support is obtained from ADSTAR.) The products supported may vary over time.

The adapter conforms to the System/370 parallel channel architecture as described in the *IBM System/360 and System/370 I/O Interface Channel to Control Unit OEMI* (GA22-6974) with the following exceptions: 1) The adapter only supports four control units per channel instead of eight; and 2) The adapter supports a block-Multiplexer channel cable length of 200 feet rather than 400 feet.

Features

The adapter features the following:

- Provides attachment for either channel-attached printer devices or magnetic tape drives (with appropriate software obtained from Pennant Systems and ADSTAR respectively).
- Supports up to four control units per channel.
- Supports a data transfer rate of up to 4.5MBps
- Micro Channel features:
 - Programmed I/O slave
 - 24-bit Micro Channel address width
 - 16-bit Micro Channel data width

- No Micro Channel data parity or address parity support

RISC System/6000 Attachment

The IBM S/370 Channel Emulator/A adapter fits into a single Micro Channel adapter slot.

For information on which system units can use this adapter, see page 1-141.

Graphics Adapters

The following graphics adapters are available for use with the RISC System/6000 systems.

IBM Grayscale Graphics Display Adapter

The Grayscale Graphics Display Adapter is an entry-function monochrome graphics adapter that can be used with the IBM 8508 Monochrome Display.

The adapter features the following:

- Support for 1280x1024 resolution
- Support for 256 shades of gray
- Support for 16 concurrent shades of gray
- 4-bit pixels
- Programmable two-plane 64x64 pixel hardware cursor
- Micro Channel features:
 - Bus master
 - Memory and I/O slave
 - 32-bit data and address widths
 - Support for address parity
 - Requires bus refresh
 - Support for streaming data (only as a DMA bus master)
 - Machine-readable vital product data (VPD)
 - Type-5-adapter-card size.

RISC System/6000 Attachment

The adapter fits any Type-5 Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM Color Graphics Display Adapter

The Color Graphics Display Adapter is an entry-function color graphics adapter. The adapter can be used with all RISC System/6000 color displays at a 1280x1024 display mode.

The Color Graphics Display Adapter features the following:

- Support for 1280 by 1024 resolution
- Support for 16.7 million color palette
- Support for 256 concurrent colors
- 4- or 8-bit pixels
- Programmable two-plane 64 by 64 pixel hardware cursor
- Micro Channel features:
 - Bus master
 - Memory and I/O slave
 - 32-bit data and address widths
 - Support for address parity
 - Requires bus refresh
 - Support for streaming data (only as a DMA bus master)
 - Machine-readable vital product data (VPD)
 - Type-5-adapter-card size.

RISC System/6000 Attachment

The adapter fits any Type-5 Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM POWER Gt1 and Gt1b Feature

The IBM POWER Gt1 Feature is a graphics adapter for use with the Model 220 (FCC Class A). The Gt1b provides the same performance as the Gt1 and meets FCC class B. The standard adapter supports 1 bit per pixel. Video memory upgrades are available that allow support for up to 4 or 8 bits per pixel. The adapter supports all RISC System/6000 displays at a 1280x1024 display mode. Maximum pixel frequency of Gt1b is 112 MHz.

The adapter features the following:

- Graphics assist functions:
 - XY pixel addressing
 - Window offset
 - Clipping function.
- Programmable hardware cursor (3-color plus transparent sprite (3 out of 16.7 million colors))
- Support for the following displays:
 - 5081 Model 16 (1280 by 1024)
 - 6091 Model 16 (1280 by 1024)
 - 6091 Model 19 (1280 by 1024)
 - 6091 Model 23 (1280 by 1024)
 - 8507 (1024 by 768)
 - 8514 (1024 by 768)
 - 8515 (1024 by 768)
 - 8517 (1024 by 768).

For 5081 and 6091 models, a cable for the monitor attachment must be ordered; other models listed come with a cable.

RISC System/6000 Attachment

The POWER Gt1 attaches directly to the Model 220 processor system board and does not require a Micro Channel adapter slot.

For information on which system units can use this adapter, see page 1-141.

IBM POWER Gt1x Feature

The IBM POWER Gt1x provides excellent entry level graphics for the Model 220 and 230 Workstations. The POWER Gt1x drives a large number of OEM displays including Sun displays.

The POWER Gt1x features:

- 8 bit (256 color) frame buffer
- Complies to ISO 9241
- Installs in integrated graphics slot (does not require a Micro Channel slot)
- Supports 1280x1024 and 1024x768 resolution monitors
- Supports 60, 67, 72, 74 & 77 Hz frame rates at 1280x1024 resolution
- Supports 76 Hz frame rate at 1152x900 (Sun Monitors) resolution
- Supports 60, 70, 75.8 Hz frame rates at 1024x768
- Contains a Gt1 compatibility mode for easy software porting
- Supports both 220 and 230.

For information on which system units can use this adapter, see page 1-141.

IBM POWER Gt3i Feature

The POWER Gt3i is a subsystem for 2D applications. The adapter supports 256 colors per pixel from a palette of 16.7 million colors and can be used with all RISC System/6000 color

displays at a 1280x1024 display mode. A cable for monitor attachment is included with the adapter.

Both 60 Hz and 77 Hz screen refresh frequencies are supported.

The adapter features the following:

- 2D drawing primitives
 - Point line
 - Filled and unfilled (spans, rectangles, polygons, arcs)
 - Raster text.
- Programmable hardware cursor:
 - 3-color plus transparent sprite (3 out of 16.7 million colors)
 - Cross-hair.
- Eight control planes:
 - Two (2) overlay planes
 - Four (4) window control planes
 - One global masking plane
 - One licensed-internal-code plane.
- One hardware colormap
- Support for bit block transfer
- Micro Channel features:
 - Bus master
 - Memory slave
 - 32-bit data and address widths
 - Support for data and address parity
 - Support for streaming data (only as a 32-bit DMA bus master)
 - Machine-readable vital product data (VPD).

RISC System/6000 Attachment

The POWER Gt3i graphics adapter occupies one Micro Channel adapter slot.

For information on which system units can use this adapter, see page 1-141.

IBM POWER Gt4e Feature

The POWER Gt4e is a graphics subsystem that features 3D solid-surface modeling and rendering, and also supports 2D applications. The Gt4e provides a significant performance improvement over the IBM High-Performance 8-Bit 3D Color Graphics Processor.

The adapter supports 256 colors per pixel from a palette of 16.7 million colors and can be used with all RISC System/6000 color displays at a 1280x1024 display mode. A cable for monitor attachment is included with the adapter.

Both 60 Hz and 77 Hz monitor screen non-interlaced refresh frequencies are supported.

The adapter features the following:

- Double buffering
- 3D solid surface modeling
 - Shading (Gouraud and flat)
 - Dithering
 - Lighting
 - Up to eight multiple colored light sources
 - Support for ambient, diffuse, and specular lighting
 - Support for back face culling
- Vectors (2D and wireframes)
 - Depth cueing
 - Anti-aliasing

- Programmable hardware cursor
 - 3-color plus transparent sprite (three out of 16.7 million colors)
 - Cross-hair
- Eight control planes
 - Two overlay planes
 - Four window control planes
 - One global masking plane
 - One licensed internal code plane
- Two hardware colormaps (256 by (8,8,8))
- Support for advanced graphics primitives
 - Ellipse/arc
 - Splines
 - Trimmed and untrimmed NURB surfaces
 - Triangle strip
 - Polygons with or without vertex data
 - Polyhedron edge
 - Annotation text
 - Line/marker grid
- Support for six-plane clipping and three-axis transformation (scale, rotate, translate)
- Support for bit block transfer
- Support for integer and floating-point coordinates
- Micro Channel considerations:
 - Bus master
 - Memory slave
 - 32-bit data and address widths
 - Support for data and address parity
 - Support for streaming data (only as a 32-bit DMA bus master)
 - Machine-readable vital product data (VPD)
 - Type-3-adaptor-card size (oversize 4 inches x 12 inches).

RISC System/6000 Attachment

The POWER Gt4e graphics adapter occupies one Micro Channel adapter slot.

For information on which system units can use this adapter, see page 1-141.

IBM POWER Gt4i and Gt4xi Features

The POWER Gt4i and Gt4xi are subsystems that feature 3D solid surface modeling and rendering as well as 2D applications. The Gt4xi addresses a diverse set of application areas from design automation to molecular modeling. The Gt4i addresses similar applications but with a more modest performance level.

Both the Gt4i and the Gt4xi have 8- and 24-bit versions. The 8-bit versions support 256 colors per pixel from a palette of 16.7 million colors; the 24-bit versions support true color at 16.7 million colors per pixel.

A 24-bit upgrade, the POWER Gt4i 8- to 24-Bit Upgrade, is available to convert the 8-bit versions to 24 bits. A performance option is available for the Gt4i 8-bit and 24-bit subsystems. When installed, the option boosts the performance of the Gt4i to the level of the Gt4xi.

The adapter can be used with all RISC System/6000 color displays at a 1280 by 1024 display mode. A cable for monitor attachment is included with the adapter.

The adapter features the following:

- Double buffering
- 3D solid surface modeling:

- Shading (Gouraud and flat)
- Lighting
- Up to eight multiple colored light sources
- Support for ambient, diffuse, and specular lighting
- Support for back face culling
- Vectors (2D and wireframes):
 - Depth cueing
 - Anti-aliasing
- Monitor screen refresh frequencies
 - 60 Hz
 - 77 Hz
- Programmable hardware cursor:
 - 3-color plus transparent sprite (three out of 16.7 million colors)
 - Cross-hair
- Eight control planes:
 - Two overlay planes
 - Four window control planes
 - One global masking plane
 - One licensed internal code plane
- Five hardware colormaps (256 by (8,8,8))
- Support for advanced graphics primitives:
 - Ellipse/arc
 - Splines
 - Trimmed and untrimmed NURB surfaces
 - Triangle strip
 - Polygons with or without vertex data
 - Polyhedron edge
 - Annotation text
 - Line/marker grid
- Support for six-plane clipping and three-axis transformation (scale, rotate, translate)
- Support for bit block transfer
- Support for integer and floating-point coordinates
- Micro Channel features:
 - Bus master
 - Memory slave
 - 32-bit data and address widths
 - Support for data and address parity
 - Support for streaming data (only as a 32-bit DMA bus master)
 - Machine-readable Vital Product Data (VPD)
 - Type 5 adapter card size.

RISC System/6000 Attachment

The POWER Gt4i or Gt4xi 8-Bit Feature fits into any two adjacent Micro Channel adapter slots.

For information on which system units can use this adapter, see page 1-141.

IBM POWER GXT100 and POWER GXT150 Graphics Adapters

The POWER GXT100 and POWER GXT150 graphics adapters are designed for superior 2D performance in an AIXWindows 2D Environment. These adapters are available for the Model 250 only.

The POWER GXT100 graphics adapter is an entry level adapter for 1024x768 resolution 2D graphics. The POWER GXT150 graphics adapter has additional VRAM that allows

1280x1024 and 1152x900 resolution support, multiple color palettes, and hardware window support.

Both graphics adapters are 8-bit single buffer, 256-color graphics features that attach directly to the PowerPC bus in the 7011 Model 250. These adapters do not use a Micro Channel slot. Each adapter requires AIXwindows Environment/6000 Version 1.2.5 2D (support for X11R5) or later and AIX Version 3.2.5 for RISC System/6000.

These adapters have the following:

- Single-chip 2D graphical user interface (GUI) accelerator for X-Windows
- Poly Command Graphics Interface
 - Points
 - Lines
 - Triangles
 - Rectangles
 - Quadrilaterals
 - Color-expanded bit block transfer
- Pattern fill support
- Rectangular and non-rectangular clipping
- 60 to 77 Hz refresh modes
- Meets ISO 9241 Part 3 on appropriate displays
- Maximum of one POWER GXT100 or POWER GXT150 graphics adapter can be installed per system.

The POWER GXT150 with its 3MB VRAM has the following additional features:

- Hardware window support
- 1280 by 1024 and 1152 by 900 resolution support
- Multiple color palettes.

RISC System/6000 Attachment

The POWER GXT100 and POWER GXT150 graphics adapters are designed to operate in the RISC System/6000 Model 250 series only.

IBM 5085 and 5086 Attachment Adapters

The 5085 and 5086 Attachment Adapters, which are physically identical to the System/370 Host Interface Adapter but have different licensed internal code loaded, allow RISC System/6000 system units to attach to an IBM 5085 or 5086 Graphics Processor.

The adapters run in primary mode and feature the following:

- 64KB memory buffers
- 16 link addresses
- Micro Channel features:
 - Bus master
 - Memory and I/O slave
 - 16-bit data width
 - 24-bit address width
 - Support for data and address parity
 - Requires bus refresh
 - Machine-readable Vital Product Data (VPD)
 - Type-5-adapter-card size.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM Graphics Input Device Adapter

The Graphics Input Device Adapter attaches the 6094 Model 10 Dials and the 6094 Lighted Programmable Function Keyboard to RISC System/6000 system units. This two-port card provides control lines as well as DC power from the RISC System/6000 system unit to the attached devices.

The adapter has the following Micro Channel features:

- I/O slave
- 8-bit data width
- 16-bit address width
- Support for data and address parity
- Machine-readable vital product data (VPD)
- Type-3-adapter-card size.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

Disk I/O Adapters

IBM SCSI High-Performance I/O Controller

The IBM SCSI High-Performance I/O Controller and the integrated SCSI controller enable control of single-ended SCSI devices; all units come standard with one Small Computer System Interface (SCSI) controller.

Note: The version of the integrated controller used in the Models M20, M2A, 220, 230, and 250 is based on a different design than the one discussed here.

The SCSI devices supported are internal or external disk drives, CD-ROM, and tape drives.

Each SCSI I/O controller can have a maximum of seven SCSI devices attached, using daisy-chained cables (maximum of 6 m (20 ft).

The controller features the following:

- Ability to accept multiple commands per device
- SCSI data rate of up to 5MBps (synchronous protocol)
- Asynchronous data transfer rate of up to 1.25MBps
- SCSI initiator (command issuer)
- Streaming data mode (100 ns cycle) memory I/O command and status transfer
- Streaming data mode (100 ns cycle) DMA bus master data transfer
- 40MBps burst length
- Programmable DMA burst length of 4 to 128 bytes
- Fully programmable interrupt levels
- Micro Channel features:
 - Bus master
 - Memory slave
 - 32-bit data and address widths
 - Support for data and address parity
 - Support for streaming data (as a DMA bus master or as a memory slave)
 - Machine-readable vital product data (VPD)
 - Type-3-adapter-card size.

Increased Availability Configurations

All RISC System/6000 systems, except the 7015 POWERservers, can share an external SCSI bus with another RISC System/6000 system. This sharing may improve system availability and aid in recovery from certain types of hardware, software, and media failures. If one of the systems involved, or its SCSI controller, fails, another system can access the shared drives.

Note: Increased availability configurations are supported only by the SCSI High-Performance I/O Controller, Feature Code 2835. The controller must be part number 00G1887 or later. Models 220, 230, 340, and 350 cannot use their integrated SCSI adapter for shared drives in an increased availability configuration.

RISC System/6000 Attachment

The SCSI High-Performance I/O Controller fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

The number of SCSI I/O controllers and the types of cables needed vary according to your configuration; please discuss particular plans with your IBM representative.

IBM SCSI-2 High-Performance I/O Controller

The IBM SCSI-2 High-Performance I/O Controller enables control of single-ended SCSI devices.

The SCSI-2 I/O High-Performance Controller provides several new functions consistent with the SCSI-2 committee recommendations, such as command tag queuing (CTQ) and 10 MBps SCSI bus operation, and incorporates the type-A (50-pin) high-density D-shell external connector.

The SCSI-2 I/O High-Performance Controller supports the attachment of 9334 Model 500 towers to RISC System/6000 7011, 7012, and 7013 system units and the attachment of 9334 Model 010 drawers in RISC System/6000 7015 system units and 7202 expansion racks. The SCSI-2 I/O High-Performance Controller also supports devices on increased availability configurations.

The SCSI devices supported are internal or external disk drives, CD-ROM, and tape drives.

Each SCSI-2 I/O controller can have a maximum of seven SCSI devices attached.

The controller features the following:

- SCSI data rate of up to 10MBps (synchronous protocol)
- Asynchronous data transfer rate of up to 2.5MBps
- Command tag queuing
- SCSI initiator (Command Issuer)
- SCSI target mode capability
- Ability to accept multiple commands per device
- 40MBps burst length
- Programmable DMA burst length (4 to 128 bytes)
- Fully programmable interrupt levels
- Micro Channel features:
 - Bus master
 - Memory slave
 - 32-bit data and address widths
 - Support for data and address parity
 - Support for streaming data (as a DMA bus master or as a memory slave)
 - Machine-readable vital product data (VPD)
 - Type-3-adapter-card size.

Increased Availability Configurations

All RISC System/6000 systems, except the 7015 POWERservers, can share an external SCSI bus with another RISC System/6000 system. This sharing may increase system availability and aid in recovery from certain types of hardware, software, and media failures. If one of the systems involved, or its SCSI controller, fails, the other system can access the shared drives.

Note: Increased availability configurations are also supported by the SCSI-2 High-Performance I/O Controller, feature code 2410.

RISC System/6000 Attachment

The SCSI-2 High-Performance I/O Controller fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

The number of SCSI-2 I/O controllers and the types of cables needed vary according to your configuration; please discuss particular plans with your IBM marketing representative.

IBM SCSI-2 Differential High-Performance External I/O Controller

The IBM SCSI-2 Differential High-Performance I/O Controller enables control of differential SCSI devices.

The SCSI-2 Differential High-Performance external I/O Controller provides several new functions consistent with the SCSI-2 committee recommendations, such as command tag queuing (CTQ) and 10 MBps SCSI bus operation, and incorporates the type-A (50-pin) high-density D-shell external connector.

The SCSI-2 Differential High-Performance external I/O Controller supports the attachment of 9334-501 towers to RISC System/6000 7012, and 7013 system units, and the attachment of 9334-011 drawers in RISC System/6000 7015 system units and 7202 expansion racks. The SCSI-2 Differential High-Performance External I/O Controller also supports the attachment of the 9334 differential expansion unit on increased availability configurations.

Each SCSI-2 Differential High-Performance External I/O Controller can have up to two 9334 differential expansion units attached.

The controller features the following:

- SCSI data rate of up to 10MBps (synchronous protocol)
- Asynchronous data transfer rate of up to 2.5MBps
- Command tag queuing
- SCSI initiator (Command Issuer)
- SCSI target mode capability
- Ability to accept multiple commands per device
- 40MBps burst length
- Programmable DMA burst length (4 to 128 bytes)
- Fully programmable interrupt levels
- Micro Channel features:
 - 32-bit Bus master
 - Memory slave
 - 32-bit data and address widths
 - Support for data and address parity
 - Support for streaming data (as a DMA bus master or as a memory slave)
 - Machine-readable Vital Product Data (VPD)
 - Type-3-adapter-card size.

Increased Availability Configurations

RISC System/6000 systems can share an external SCSI bus with another RISC System/6000 system. This sharing may improve system availability and aid in recovery from certain types of hardware, software, and media failures. If one of the systems involved, or its SCSI controller, fails, the other system can access the shared drives.

Note: Increased availability configurations are also supported by the SCSI-2 differential High-Performance External I/O Controller, feature code 2420.

RISC System/6000 Attachment

The SCSI-2 Differential High-Performance I/O Controller fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

The number of SCSI-2 I/O controllers and the types of cables needed vary according to your configuration; please discuss particular plans with your IBM marketing representative.

IBM High-Performance Disk Drive Subsystem Adapter

The 9333 High-Performance Subsystem Adapter provides support for IBM 9333 Model 10 drawers and IBM 9333 Model 500 deskside subsystems. Each adapter has four ports, and each port supports the attachment of a single subsystem.

The adapter features the following:

- Support for attachment of up to four cables.
- Support for up to 16 disk drives per adapter.
- 8MB per second full duplex operation with packet multiplexing (allows concurrent communication with all devices attached using the same serial link).
- Point-to-point communication using one outbound twisted-pair and one inbound twisted-pair. Maximum cable length is 10 m (33 ft) for connection between adjacent racks.
- Support for high availability configurations, where one drawer supports connection to two adapters. Such configurations can increase system availability and aid in recovery from certain types of hardware, software, and media failures.
- Micro Channel features:
 - 32-bit bus master
 - I/O slave
 - 16- or 32-bit data widths
 - 24- or 32-bit address widths
 - Support for data and address parity
 - Support for streaming data (as a DMA bus master only)
 - Machine-readable Vital Product Data (VPD)
 - Type 5 adapter card size.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM High-Performance Subsystem Adapter 40/80MBps

The IBM High-Performance Subsystem Adapter 40/80MBps provides support for the IBM High-Performance Disk Drive Model 011 drawers and 501 deskside subsystems. Each adapter has four ports. Each port supports one IBM 9333 High-Performance Disk Drive Subsystem.

This IBM High-Performance Subsystem Adapter 40/80MBps is very similar to the IBM High-Performance Disk Drive Subsystem Adapter. This adapter features the ability to attach up to eight RISC System/6000 systems to a single IBM 9333 Model 011 drawer or a 501 deskside subsystem.

RISC System/6000 Attachment

The adapter fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

Other Supported IBM Adapters

IBM M-Audio Capture and Playback Adapter

The Multimedia-Audio Capture and Playback Adapter (M-ACPA) allows audio data to be recorded and played back on a RISC System/6000. Data can be recorded using a microphone or line input from another device. Data playback is accomplished using a powered speaker, headphones, or line output to another device.

The M-ACPA is a high-quality audio board that receives input from a microphone or standard stereo line input, digitizes the signal, and makes the signal data available to applications. The adapter also supports the conversion of digital data into analog signals that can be played back on stereo speakers, headphones, or a standard stereo line output.

M-ACPA features include:

- 320C25 digital signal processor
- 8KB by 16-bit static RAM on-board memory
- Stereo input sampling (line left and line right) at 44.1 KHz at 16 bits
- Monaural input sampling (line right or microphone) at 88.2 KHz at 16 bits
- Two independent input channels providing support for line input and microphone input, and two independent output channels providing support for powered speakers, headphones, or line output.
- Micro Channel features include:
 - 16-bit data width
 - 16-bit address width
 - Type-3-adapter-card size

RISC System/6000 Attachment

The controller fits into a single Micro Channel adapter slot. For information on which system units can use this adapter, see page 1-141.

IBM M-Video Capture Adapter (M-VCA) (PAL Version)

The IBM M-Video Capture Adapter (m-VCA) allows video frames to be captured and saved to a file on the RISC System/6000 system.

The adapter features the following:

- Captures and displays video images.
- Data can be captured from a laser disc, VCR, or a camera which generate either a Composite, RGB, or Y/C (S-video) Signal.
- The programming interface to the M-VCA device driver is the standard AIX device driver interface.
- Includes the following entry points: open, close, read, write, and ioctl.
- There are four Display modes: Memory mode, Live mode, Overlay mode, and Transparent Pixel Overlay mode.
- There are three Capture modes: Live Capture mode, Overlay Capture mode, and Loopback Capture mode.
- Driver supports both the NTSC and PAL versions of the adapter.

IBM 9291/9295 Digital Trunk Attachment Adapters

The IBM 9291/9295 Digital Trunk Adapter and the Digital Trunk Dual Adapter allow a RISC System/6000 system unit to attach to IBM 9291 Single Digital Trunk Processor or IBM 9295 Multiple Digital Trunk Processor. The Digital Trunk Processors provide high-level voice

compression, high voice quality, and digital telephone signaling functions (transmit and receive).

The adapters feature the following:

- Support for T1 or CEPT digital interface trunk
- Support for 24 T1 or 30 CEPT channels for the Digital Trunk Adapter
- Support for 48 T1 or 60 CEPT channels for the Digital Trunk Dual Adapter
- Micro Channel features;
 - 16-bit data width
 - Support data parity
 - Machine-readable Vital Product Data (VPD)
 - Type-3–adapter-card size.

RISC System/6000 Attachment

Each controller fits into a single Micro Channel adapter slot. For information on which system units can use these adapters, see page 1-141.

Other Expansion Adapters

For further information about expansion adapters that are being commercially marketed for IBM systems, consult the *International Catalog of Micro Channel Adapter Cards*, (G360-2824), or see your IBM marketing representative. This catalog includes information on over 1,000 expansion adapters from IBM and from developers worldwide. The information is arranged under functional category headings.

Adapter Usage Summary

The following tables provide information on the adapters that can be used with each system unit. "STD" stands for Standard, "NS" stands for Not Supported.

The numbers indicate the maximum number of adapters that can be used in the given system; "Yes" indicates the system unit supports this adapter with no stated maximum, other than the number of slots available.

Communication Adapters

Adapters	System Unit				
	M20/ M2A	220	230	250	34H
8-Port Async Adapter-EIA-232	Yes	Yes	Yes	Yes	Yes
8-Port Async Adapter-EIA-422A	NS	NS	NS	NS	Yes
8-Port Async Adapter-MIL-STD 188	NS	NS	NS	NS	Yes
16-Port Async Adapter-EIA-232	NS	Yes	Yes	Yes	Yes
16-Port Async Adapter-EIA-422A	NS	NS	NS	NS	Yes
128-Port Async Controller	NS	Yes	Yes	Yes	Yes
X.25 Interface Co-Processor/2	Yes	Yes	Yes	Yes	Yes
Multiprotocol Adapter/A (MP/A)	NS	1	1	1	1
4-Port Multiprotocol Communications Controller	NS	Yes	Yes	Yes	Yes
Realtime Interface Co-Processor Multiport Adapter	NS	Yes	Yes	Yes	Yes
Realtime Interface Co-Processor Portmaster Adapter	NS	Yes	Yes	Yes	Yes
Token-Ring High-Performance Network Adapter	Yes	Yes	Yes	Yes	Yes
Ethernet High-Performance LAN Adapter ¹	Yes	Yes	Yes	Yes	3
3270 Connection Adapter	NS	Yes	Yes	Yes	Yes
S/370 Host Interface Adapter	NS	NS	NS	NS	1
Fiber Distributed Data Interface Adapter (Fiber Optic) ²	NS	Yes	Yes	Yes	4 SAS 2 DAS
Fiber Distributed Data Interface Adapter (Shielded Twisted-Pair) ²	NS	Yes	Yes	Yes	4 SAS 2 DAS
Serial Optical Channel Converter	NS	NS	NS	NS	NS

Notes:

1. The Models 220, 230, and 250 feature an integrated Ethernet adapter and up to two High-Performance Ethernet Adapters. Model 34H, while featuring an integrated Ethernet adapter, can support up to three Ethernet High-Performance LAN Adapters. The Models M20 and M2A feature an integrated Ethernet adapter and can support an additional Ethernet High-Performance LAN adapter.
2. On diskless Model 220 and Model 230 configurations, remote IPL is currently not supported on FDDI. Therefore, FDDI may not be the primary connection from client to server.

Adapters	System Unit				
	355	360	365	370	375
8-Port Async Adapter-EIA-232	NS	Yes	NS	Yes	NS
8-Port Async Adapter-EIA-422A	NS	Yes	NS	Yes	NS
8-Port Async Adapter-MIL-STD 188	NS	Yes	NS	Yes	NS
16-Port Async Adapter-EIA-232	NS	Yes	NS	Yes	NS
16-Port Async Adapter-EIA-422A	NS	Yes	NS	Yes	NS
128-Port Async Controller	NS	Yes	NS	Yes	NS
X.25 Interface Co-Processor/2	Yes	Yes	Yes	Yes	Yes
Multiprotocol Adapter/A (MP/A)	1	1	1	1	1
4-Port Multiprotocol Communications Controller	Yes	Yes	Yes	Yes	Yes
Realtime Interface Co-Processor Multiport Adapter	NS	Yes	NS	Yes	NS
Realtime Interface Co-Processor Portmaster Adapter	NS	Yes	NS	Yes	NS
Token-Ring High-Performance Network Adapter	Yes	Yes	Yes	Yes	Yes
Ethernet High-Performance LAN Adapter ¹	Yes	Yes	Yes	Yes	Yes
3270 Connection Adapter	Yes	Yes	Yes	Yes	Yes
S/370 Host Interface Adapter	1	1	1	1	1
Fiber Distributed Data Interface Adapter (Fiber Optic) ²	1 SAS	4 SAS 2 DAS	1 SAS	4 SAS 2 DAS	1 SAS
Fiber Distributed Data Interface Adapter (Shielded Twisted-Pair) ²	1 SAS	4 SAS 2 DAS	1 SAS	4 SAS 2 DAS	1 SAS
Serial Optical Channel Converter	NS	NS	NS	NS	NS

Notes:

1. The Models 220, 230, and 250 feature an integrated Ethernet adapter and up to two High-Performance Ethernet Adapters. Model 34H, while featuring an integrated Ethernet adapter, can support up to three Ethernet High-Performance LAN Adapters. The Models M20 and M2A feature an integrated Ethernet adapter and can support an additional Ethernet High-Performance LAN adapter.
2. On diskless Model 220 and Model 230 configurations, remote IPL is currently not supported on FDDI. Therefore, FDDI may not be the primary connection from client to server.

Adapters	System Unit				
	52H	550L	570	580	58H
8-Port Async Adapter-EIA-232	7	4	8	7	7
8-Port Async Adapter-EIA-422A	7	4	7	7	7
8-Port Async Adapter-MIL-STD 188	7	4	7	7	7
16-Port Async Adapter-EIA-232	7	4	7	7	7
16-Port Async Adapter-EIA-422A	7	4	7	7	7
128-Port Async Controller	7	4	7	7	7
X.25 Interface Co-Processor/2	4	4	4	4	4
Multiprotocol Adapter/A (MP/A)	1	1	1	1	1
4-Port Multiprotocol Communications Controller	7	4	7	7	7
Realtime Interface Co-Processor Multiport Adapter	Yes	Yes	Yes	Yes	Yes
Realtime Interface Co-Processor Portmaster Adapter	Yes	Yes	Yes	Yes	Yes
Token-Ring High-Performance Network Adapter	4	4	4	4	4
Ethernet High-Performance LAN Adapter ¹	4	4	4	4	4
3270 Connection Adapter	Yes	Yes	Yes	Yes	Yes
S/370 Host Interface Adapter	1	1	1	1	1
Fiber Distributed Data Interface Adapter (Fiber Optic) ²	6SAS 3DAS	4SAS 2DAS	6SAS 3DAS	6SAS 3DAS	6SAS 3DAS
Fiber Distributed Data Interface Adapter (Shielded Twisted-Pair) ²	7SAS 3DAS	4SAS 2DAS	7SAS 3DAS	7SAS 3DAS	7SAS 3DAS
Serial Optical Channel Converter	1	NS	1	1	NS

Notes:

1. The Models 220, 230, and 250 feature an integrated Ethernet adapter and up to two High-Performance Ethernet Adapters. Model 34H, while featuring an integrated Ethernet adapter, can support up to three Ethernet High-Performance LAN Adapters. The Models M20 and M2A feature an integrated Ethernet adapter and can support an additional Ethernet High-Performance LAN adapter.
2. On diskless Model 220 and Model 230 configurations, remote IPL is currently not supported on FDDI. Therefore, FDDI may not be the primary connection from client to server.

Adapters	System Unit				
	590	970B ³ / 980B	990		
8-Port Async Adapter-EIA-232	7	15	15		
8-Port Async Adapter-EIA-422A	7	15	15		
8-Port Async Adapter-MIL-STD 188	7	15	15		
16-Port Async Adapter-EIA-232	7	15	15		
16-Port Async Adapter-EIA-422A	7	15	15		
128-Port Async Controller	7	7	7		
X.25 Interface Co-Processor/2	4	8	8		
Multiprotocol Adapter/A (MP/A)	1	NS	NS		
4-Port Multiprotocol Communications Controller	7	8	8		
Realtime Interface Co-processor Multiport Adapter	Yes	8	8		
Realtime Interface Co-processor Portmaster Adapter	Yes	8	8		
Token-Ring High-Performance Network Adapter	4	8	8		
Ethernet High-Performance LAN Adapter ¹	4	8	8		
3270 Connection Adapter	Yes	Yes	Yes		
S/370 Host Interface Adapter	1	1	1		
Fiber Distributed Data Interface Adapter (Fiber Optic) ²	6SAS 3DAS	8 SAS 4 DAS	8 SAS 4 DAS		
Fiber Distributed Data Interface Adapter (Shielded twisted-pair) ²	7SAS 3DAS	8 SAS 4 DAS	8 SAS 4 DAS		
Serial Optical Channel Converter	NS	2	NS		

Notes:

1. The Models 220, 230, and 250 feature an integrated Ethernet adapter and up to two High-Performance Ethernet Adapters. Model 34H, while featuring an integrated Ethernet adapter, can support up to three Ethernet High-Performance LAN Adapters. The Models M20 and M2A feature an integrated Ethernet adapter and can support an additional Ethernet High-Performance LAN adapter.
2. On diskless Model 220 and Model 230 configurations, remote IPL is currently not supported on FDDI. Therefore, FDDI may not be the primary connection from client to server.
3. An optional eight-slot I/O board is available for the 970B allowing a maximum of 16 slots.

Channel Attachment Adapters

Adapters	System Unit				
	M20/ M2A	220	230	250	34H
S/370 Block Multiplexer Channel Adapter	NS	NS	NS	NS	2
System/390 ESCON Channel Adapter ¹	NS	NS	NS	NS	NS
HIPPI Adapter ²	NS	NS	NS	NS	NS
S/370 Channel Emulator/A	NS	NS	NS	NS	2/4 ³

Adapters	System Unit				
	355	360	365	370	375
S/370 Block Multiplexer Channel Adapter	1	2	1	2	2
System/390 ESCON Channel Adapter ¹	NS	NS	NS	NS	NS
HIPPI Adapter ²	NS	NS	NS	NS	NS
S/370 Channel Emulator/A	1	2/4 ³	1	2/4 ³	1

Notes:

1. This feature requires two contiguous Micro Channel slots.
2. This feature requires five contiguous Micro Channel slots
3. Two adapters when using AIX Parallel Channel Tape Attachment, four adapters when using Print Services Facility/6000.

Adapters	System Unit				
	52H	550L	570	580	58H
S/370 Block Multiplexer Channel Adapter	2	2	2	2	2
System/390 ESCON Channel Adapter ¹	1	1	2	2	2
HIPPI Adapter ²	NS	NS	1	1	1
S/370 Channel Emulator/A	4	4	4	4	4

Adapters	System Unit				
	590	970B ³ / 980B	990		
S/370 Block Multiplexer Channel Adapter	2	2	2		
System/390 ESCON Channel Adapter ¹	2	2	2		
HIPPI Adapter ²	1	2	2		
S/370 Channel Emulator/A	4	4	4		

Notes:

1. This feature requires two contiguous Micro Channel slots.
2. This feature requires five contiguous Micro Channel slots
3. An optional eight-slot I/O Board is available for the 970B allowing a maximum of 16 slots.

Graphic Adapters

Adapters	System Unit				
	M20/ M2A	220	230	250	34H
Grayscale Graphics Display Adapter	NS	NS	NS	NS	2
Color Graphics Display Adapter	NS	NS	NS	NS	2
High-Performance 8-Bit 3D Color Graphics Processor	NS	NS	NS	NS	1
High-Performance 24-Bit 3D Color Graphics Processor	NS	NS	NS	NS	1
POWER Gt1, Gt1b	Included	1	NS	NS	NS
POWER Gt1x	NS	1	1	NS	NS
POWER Gt4e	NS	Yes	Yes	Yes	2
POWER Gt3i	NS	Yes	Yes	Yes	2
POWER Gt4i, Gt4xi	NS	NS	NS	NS	1
POWER GXT100, GXT150	NS	NS	NS	1	NS
5085 and 5086 Attachment Adapters	NS	NS	NS	NS	1
Graphics Input Device Adapter	NS	NS	NS	Yes	Yes
POWER GTO Accelerator Adapter	NS	1	1	1	1

Adapters	System Unit				
	355	360	365	370	375
Grayscale Graphics Display Adapter	1	2	1	2	1
Color Graphics Display Adapter	1	2	1	2	1
High-Performance 8-Bit 3D Color Graphics Processor	1	1	1	1	1
High-Performance 24-Bit 3D Color Graphics Processor	NS	1	NS	1	NS
POWER Gt1, Gt1b	NS	NS	NS	NS	NS
POWER Gt1x	NS	NS	NS	NS	NS
POWER Gt4e	1	2	1	2	1
POWER Gt3i	STD	2	STD	2	STD
POWER Gt4i, Gt4xi	1	2	1	2	1
POWER GXT100, GXT150	NS	NS	NS	NS	NS
5085 and 5086 Attachment Adapters	1	1	1	1	1
Graphics Input Device Adapter	Yes	Yes	Yes	Yes	Yes
POWER GTO Accelerator Adapter	1	1	1	1	1

Adapters	System Unit				
	52H	550L	570	580	58H
Grayscale Graphics Display Adapter	2	2	2	2	2
Color Graphics Display Adapter	2	2	2	2	2
High-Performance 8-Bit 3D Color Graphics Processor	2	1	NS	NS	NS
High-Performance 24-Bit 3D Color Graphics Processor	2	1	NS	NS	NS
POWER Gt1, Gt1b	NS	NS	NS	NS	NS
POWER Gt1x	NS	NS	NS	NS	NS
POWER Gt4e	2	2	2	2	2
POWER Gt3i	1	1	1	1	1
POWER Gt4i, Gt4xi	1	1	1	1	1
POWER GXT100, GXT150	NS	NS	NS	NS	NS
5085 and 5086 Attachment Adapters	1	1	1	1	1
Graphics Input Device Adapter	Yes	Yes	Yes	Yes	Yes
POWER GTO Accelerator Adapter	1	NS	1	1	1

Adapters	System Unit				
	590	970B/ 980B	990		
Grayscale Graphics Display Adapter	2	NS	NS		
Color Graphics Display Adapter	2	NS	NS		
High-Performance 8-Bit 3D Color Graphics Processor	NS	NS	NS		
High-Performance 24-Bit 3D Color Graphics Processor	NS	NS	NS		
POWER Gt1, Gt1b	NS	NS	NS		
POWER Gt1x	NS	NS	NS		
POWER Gt4e	2	NS	NS		
POWER Gt3i	1	NS	NS		
POWER Gt4i, Gt4xi	1	NS	NS		
POWER GXT100, GXT150	NS	NS	NS		
5085 and 5086 Attachment Adapters	1	1	1		
Graphics Input Device Adapter	Yes	Yes	Yes		
POWER GTO Accelerator Adapter	1	NS	NS		

Disk I/O Adapters

Adapters	System Unit				
	M20/ M2A	220	230	250	34H
SCSI High Performance I/O Controller	NS	Yes	Yes	2	3
SCSI-2 I/O Controller	NS	Yes	Yes	2	3
SCSI-2 Differential High-Performance External I/O Controller	NS	NS	NS	2	2
High-Performance Disk Drive Subsystem Adapter	NS	NS	NS	NS	1
High-Performance Subsystem Adapter 40/80MBps	NS	NS	NS	NS	

Adapters	System Unit				
	355	360	365	370	375
SCSI High Performance I/O Controller	1	3	1	2	1
SCSI-2 I/O Controller	1	3	1	2	1
SCSI-2 Differential High-Performance External I/O Controller	1	3	1	3	1
High-Performance Disk Drive Subsystem Adapter	NS	1	NS	1	NS
High-Performance Subsystem Adapter 40/80MBps					

Adapters	System Unit				
	52H	550L	570	580	58H
SCSI High Performance I/O Controller	5	3	5	5	5
SCSI-2 I/O Controller	5	3	5	5	5
SCSI-2 Differential High-Performance External I/O Controller	4	NS	4	4	4
High-Performance Disk Drive Subsystem Adapter	1	1	1	1	1
High-Performance Subsystem Adapter 40/80MBps	1	1	1	1	1

Adapters	System Unit				
	590	970B/ 980B	990		
SCSI High Performance I/O Controller	5	15	15		
SCSI-2 I/O Controller	5	15	15		
SCSI-2 Differential High-Performance External I/O Controller	4	8	8		
High-Performance Disk Drive Subsystem Adapter	1	7	7		
High-Performance Subsystem Adapter 40/80MBps	1	7	7		

Other Supported Adapters

Adapters	System Unit				
	M20/ M2A	220	230	250	34H
M-Audio Capture and Playback Adapter	NS	Yes	Yes	Yes	4
M-Video Capture Adapter (M-VCA) (PAL Version)	NS	Yes	Yes	Yes	2
9291/9295 Digital Trunk Attachment Adapter	NS	Yes	Yes	Yes	3

Adapters	System Unit				
	355	360	365	370	375
M-Audio Capture and Playback Adapter	1	4	1	4	1
M-Video Capture Adapter (M-VCA) (PAL Version)	1	2	1	2	1
9291/9295 Digital Trunk Attachment Adapter	1	3	1	3	1

Adapters	System Unit				
	52H	550L	570	580	58H
M-Audio Capture and Playback Adapter	4	4	4	4	4
M-Video Capture Adapter (M-VCA) (PAL Version)	NS	2	2	2	2
9291/9295 Digital Trunk Attachment Adapter	3	3	3	3	3

Adapters	System Unit				
	590	970B/ 980B	990		
M-Audio Capture and Playback Adapter	4	NS	7		
M-Video Capture Adapter (M-VCA) (PAL Version)	2	NS	NS		
9291/9295 Digital Trunk Attachment Adapter	3	NS	NS		

Adapter Cabling

The purpose of this section is to help you determine the types of cables you need to attach RISC System/6000 devices to their adapters. *Length* refers to the length of an IBM-provided cable.

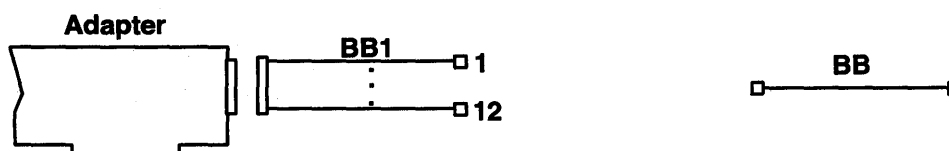
Adapters are listed in order of feature code. Adapters without a feature code are listed at the end of the section.

Notes:

1. To aid the person who is installing your system, you should use the cable planning charts in *IBM RISC System/6000 Planning for Your System Installation*, GC23-2407. When completed, these charts provide valuable information, such as system unit location, and device type and location. You also should use the cable identification labels shipped with the system unit. The labels help you keep track of which cables are used for each system unit or device as your configuration changes over time.
2. All 78-pin multiport cables used with the 7015 POWERserver attach to the system tailgate rather than to the adapter. Internal cables not shown in these cabling diagrams run from the adapter to the system tailgate, which is near the base of the system unit.

FC 2401 (IBM M-Video Capture Adapter - PAL)

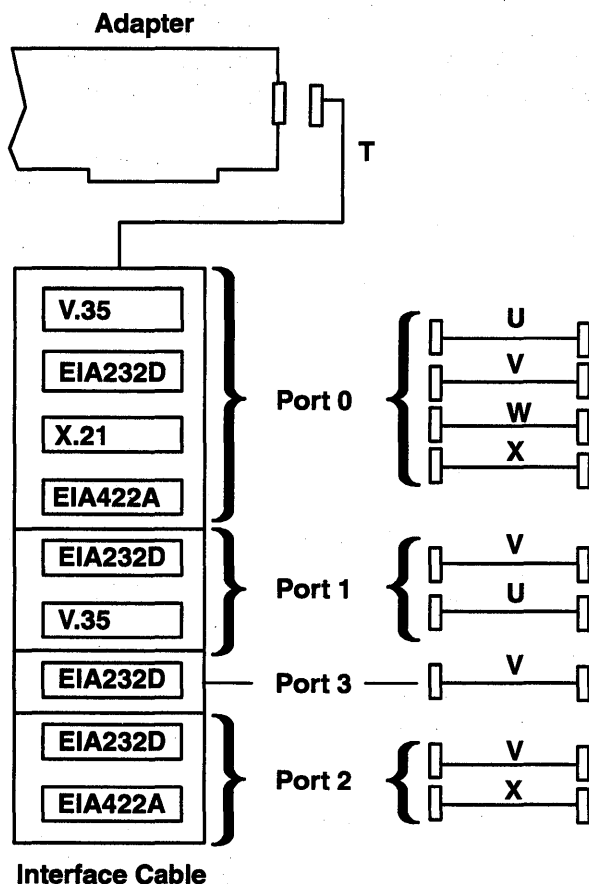
The following figure illustrates the M-Video Capture Adapter (PAL) with an attachment cable.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m	ft
BB	Customer-supplied cable	N/A	N/A	N/A	
BB1	IBM-supplied cableset	92F3714	N/A	N/A	

FC 2700 (IBM 4-Port Multiprotocol Communications Controller)

The following figure illustrates the 4-Port Multiprotocol Communications Controller with the IBM 4-Port Multiprotocol Interface Cable and attachment cables. The interface cable ports are labeled 0, 1, 3, and 2. Only one interface and associated cable can be selected per port. In order to make the necessary connections to this adapter, your setup person needs to know the type of network interface assigned to each port.

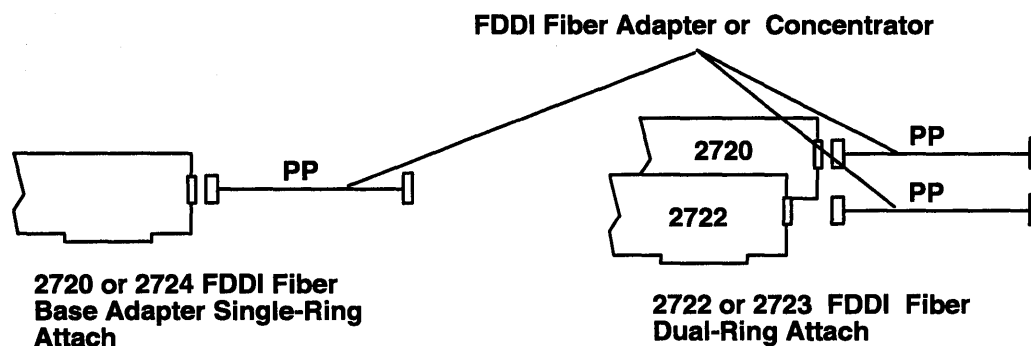


Interface Cable

Cable Letter	Cable Name	IBM Part Number	Feature Code	Length m	Length ft
T	Interface/Breakout Box	40F9897	2705	3	10
U	V.35 cable, if customer-supplied, must meet V.35 requirements	71F0162	2702	2	6.5
V	EIA-232D/V.24 cable, if customer-supplied, must meet EIA-232D/V.24 requirements	71F0165	2706	3	10
W	X.21 cable, if customer-supplied, must meet X.21 cable requirements	71F0164	2704	3	10
X	If customer-supplied, must meet EIA-422A requirements	N/A	N/A	N/A	N/A

FCs 2720, 2722, 2723, and 2724 (IBM Fiber Distributed Data Interface Adapter)

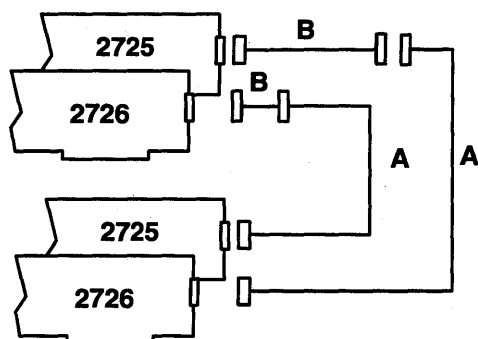
The following figure illustrates the IBM FDDI Adapter with attachment cable. Feature codes 2720 and 2724 are for the base card or single-ring attach; feature codes 2722 and 2723 are for the FDDI dual-ring upgrade kit. For more detailed information on planning for, installing, and operating the adapter, refer to the *IBM FDDI Adapter User's Guide and Programming Reference*, SC23-2426.



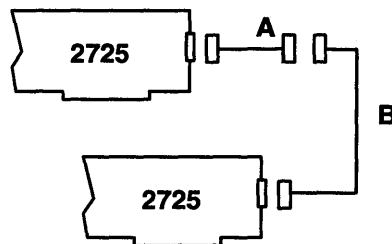
Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m ft
PP	<p>All FDDI Fiber Adapters require multi-mode FDDI optical fiber jumper cables.</p> <p>Jumper cables are the responsibility of the customer and can be ordered from the local authorized IBM cabling distributor.</p> <p>For installation of FDDI systems, refer to IBM publication <i>FDDI Introduction and Planning Guide</i>, GA27-3892.</p> <p>For additional information concerning FDDI optical systems, refer to IBM publication <i>FDDI Optical Fiber Planning and Installation Guide</i>, GA27-3943.</p>	N/A	N/A	N/A

FCs 2725 and 2726 Shielded Twisted-Pair FDDI Adapter

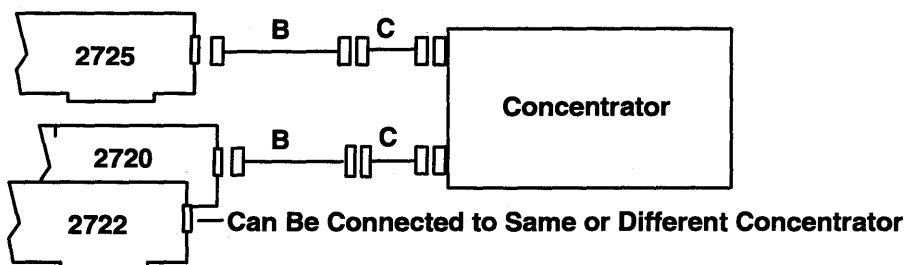
The following figures show the different FDDI-STP cabling configurations:



2726 FDDI-STP Dual-Ring Attach without a Concentrator



2725 FDDI-STP Single-Ring Attach without a Concentrator



2725 FDDI-STP Single-Ring and 2726 FDDI-STP Dual-Ring Attach to a Concentrator

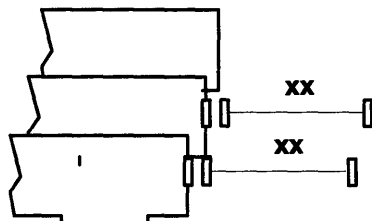
Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m	ft
A	FDDI copper adapter reversing cable	33G2762	N/A	3	9.9
B	FDDI copper adapter cable	33G2761	N/A	3	9.9
C	FDDI copper adapter cable	33G2760	N/A	3	9.9

Cable A - FDDI Copper Adapter Reversing Cable				
Adapter Card D Connector Pin	Wire Number	Wire Color	Data Connector Pin	Usage
Shield (ground)	1	Shield	Shield (ground)	Ground
1	3	Black	Black	Receive +
5	4	Red	Red	Transmit +
6	2	Orange	Orange	Receive -
9	5	Green	Green	Transmit -

Cable B - FDDI Copper Adapter Cable				
Adapter Card D Connector Pin	Wire Number	Wire Color	Data Connector Pin	Usage
Shield (ground)	1	Shield	Shield (ground)	Ground
5	3	Black	Black	Receive +
1	4	Red	Red	Transmit +
9	2	Orange	Orange	Receive -
6	5	Green	Green	Transmit -

FC 2735 (IBM HIPPI Channel Adapter)

The following figure illustrates the IBM HIPPI Channel Adapter set with the attachment cables:



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m ft
xx	Customer-supplied HIPPI cable, must be HIPPI compliant with ANSI standard HIPPI-pH X3.183-1991	N/A	N/A	N/A

FC 2755 (IBM S/370 Block Multiplexer Channel Adapter)

Establishing communications with an S/370 or S/390 host requires special planning. Cabling, hardware, and software considerations are discussed below. For more detailed information on planning for, installing, and operating the adapter, refer to the *Block Multiplexer Channel Adapter User's Guide and Service Information*, SC23-2427.

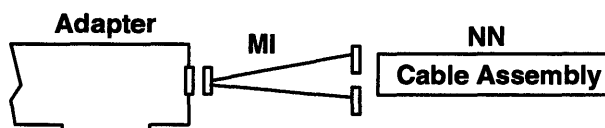
Cable Considerations

The cable and cable assembly in the following figure are separately orderable. Use of the IBM cable and cable assembly is recommended due to the critical cabling specifications required for RISC System/6000 connection to the host.

To order the cables necessary to attach the cable assembly to the host, contact your IBM marketing representative. Keep the following in mind when ordering:

Notes:

1. Blue channel cables must be used if the adapter is to be operated at 4.5MB or if the IBM 3044 Model 2 Channel Extender is used.
2. Cables (bus and tag) must be used in pairs of equal length and matching color (blue or gray, but not both). Bus and tag cables can be ordered separately and must be ordered to the desired length. The Host Channel Cable group for the RISC System/6000 is 0185.
3. There are some cable length limitations. When data streaming mode is used, there can be no more than 122 m (400 ft) between the RISC System/6000 system unit and the host. If there are other channel-attached devices located between the system unit and the host, deduct 4.5 m (15 ft) for each device in your cable measurement. Some devices may require additional cable length calculations; consult *IBM System/360, System/370, 4300, and 9370 Processors Input Output Equipment Installation Manual—Physical Planning*, GC22-7064, for the particular device.
4. The system unit can connect to an IBM 3044 Model 002 Channel Extender, which allows the System/370 parallel channel to be extended up to 3 km (1.9 miles). It can also connect to an IBM 9034 Model 1 ESCON Converter, which allows communications with a System/370 or System/390 ESCON channel. There can be up to 3 km (1.9 miles) between the 9034 and the host.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m	ft
MI	System/370 Block Multiplexer Channel Adapter Cable	92F6697	2757	1.8	6
NN	System/370 Block Multiplexer Channel Cable Interface Assembly	25F9401	2758	N/A	

Hardware Considerations

- The remote power interface as described in *IBM System/360 and System/370 Power-Control Interface Original Equipment Manufacturers' Information*, GA22-6906, is not supported on the RISC System/6000 system.
- The processors supported by the System/370 Block Multiplexer Channel Adapter are summarized below. Certain processors can use the IBM 9034 Model 1 ESCON Converter or the IBM 3044 Model 2 Channel Extender. Connection to an ESCON channel requires a 9034 Model 1. You cannot use both a 9034 and a 3044 on the same channel.

System Processor	Channel Type	Speed
9021	Parallel	Up to 4.5MB
9021	ESCON*	Up to 4.5MB
9121	Parallel	Up to 4.5MB
9121	ESCON*	Up to 4.5MB
9221	Parallel	Up to 4.5MB
9221	ESCON*	Up to 4.5MB
ES/3090	Parallel	Up to 4.5MB
ES/3090 (J)	ESCON*	Up to 4.5MB
308X	Parallel	Up to 3.0MB
4381	Parallel	Up to 3.0MB

*Requires use of the 9034 Model 1 ESCON Converter.

- The System/370 Block Multiplexer Channel Adapter supports three speeds. The type of processor channel used depends on the speed setting.

Speed Setting	Channel Speed	Processor Channel
0	DCI	Any
2	2.7MB (maximum)	3.0MB
4	4.5MB (maximum)	4.5MB

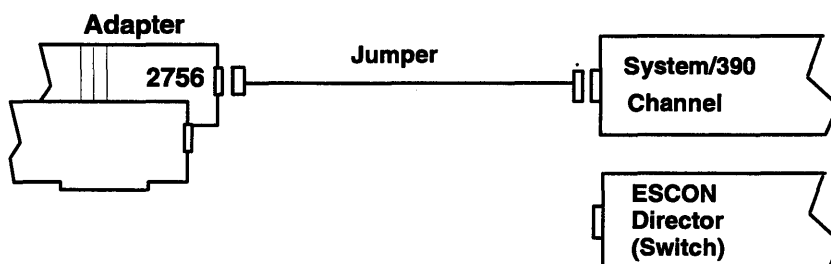
Software Considerations

Consider the following when planning for the System/370 Block Multiplexer Channel Adapter:

- AIX Version 3.2 or later for RISC System/6000 is required. Adapter channel address and speed are set up using SMIT.
- The System/390 host I/O control program (IOCP) must be updated to include the RISC System/6000 system. The RISC System/6000 system is defined as a 3088.
- The System/390 host operating systems must be updated to recognize and support the RISC System/6000 system unit.

FC 2756 (IBM System/390 ESCON Channel Adapter)

Establishing communications with a System/390 host requires special planning. Cabling, hardware, and software considerations are discussed below. For more detailed information on planning for, installing, and operating the adapter, refer to the *IBM Enterprise System Connection Adapter User's Guide and Service Information, SC23-2474*.



Note: The ESCON jumper cable can connect to any ESCON channel, trunk, or ESCON director.

Cable Considerations

The ESCON cable is separately orderable.

To order the cable necessary to attach to the host, contact your IBM marketing representative. The following table lists the standard ESCON duplex-to-duplex jumper cable part numbers.

Cable Name/Description	IBM Part Number	Length	
		m	ft
System/390 ESCON Channel Jumper Cable (Duplex-to-Duplex)	74F5412	3.7	12
	74F5413	6.1	20
	74F5414	12.1	40
	74F5415	21.3	70
	74F5416	30.4	100
	74F5417	61	200
	74F5418	122	400

Refer to *Maintenance Information for Enterprise Systems Connection Links, SY27-2597* for additional information.

Hardware Considerations

The processors supported by the System/390 ESCON Channel Adapter are summarized below.

System Processor	Channel Type	Speed
9021	ESCON	Up to 17MB
9121	ESCON	Up to 10MB
9221	ESCON	Up to 10MB
ES/3090 (J)	ESCON	Up to 10MB

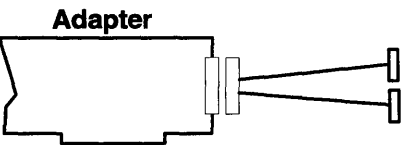
Software Considerations

Consider the following when planning for the ESCON channel adapter:

- AIX Version 3.2 or later is required. Adapter channel address and speed are set up using SMIT.
- The System/390 I/O Control Program (IOCP) must be updated to include the RISC System/6000 system. The IOCP should specify a 3088 device type.
- The System/390 operating system must be updated to recognize and support the RISC System/6000 system unit.

FC 2759 (S/370 Channel Emulator/A Adapter)

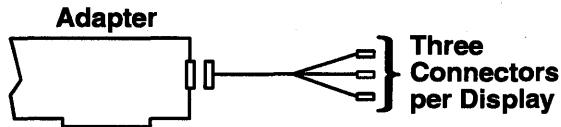
The following figure illustrates the S/370 Channel Emulator/A adapter with an attachment cable (the cable is included with the feature):



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
	S/370 Channel Emulator/A Cable	68F7209	N/A	2.4	7.9

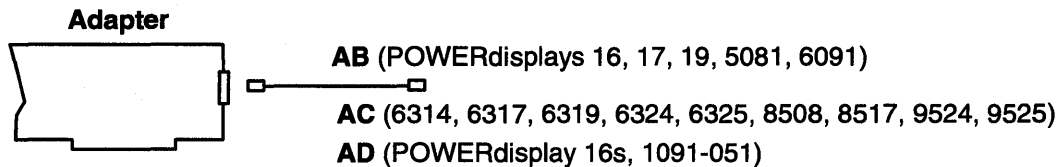
FC 2711, 2713 (IBM POWER Gt4i and Gt4xi)

The figure below illustrates the POWER Gt4i and Gt4xi with an attachment cable for one display.



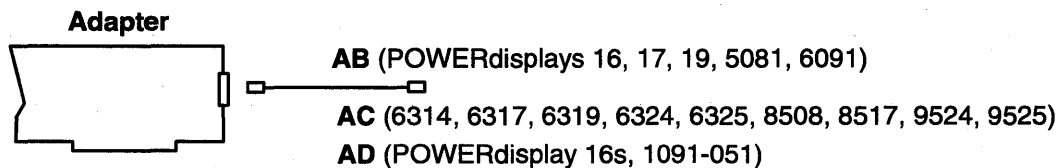
Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m	ft
CC	Display adapter cable, contains an integral toroid assembly	58F2903	N/A	2.4	8

FC 2766 (IBM POWER GXT100 Graphics Adapter)



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m	ft
AB	Display cable, 3 BNC connectors	09G3539	4214	1.83	6
AC	Display conversion cable, 13W3 to 15-pin	51G7826	4213	0.3	1
AD	Display cable, 5 BNC connectors	09G3589	4229	1.83	6

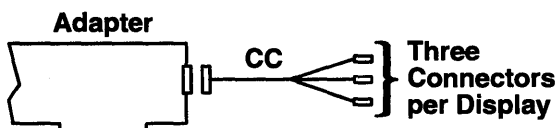
FC 2767 (IBM POWER GXT150 Graphics Adapter)



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m	ft
AB	Display cable, 3 BNC connectors	09G3539	4214	1.83	6
AC	Display conversion cable, 13W3 to 15-pin	51G7826	4213	0.3	1
AD	Display cable, 5 BNC connectors	09G3589	4229	1.83	6

FC 2768 (IBM POWER Gt4e)

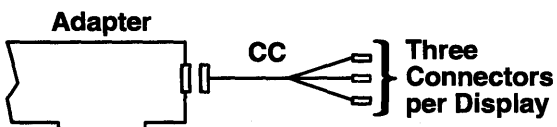
The following figure illustrates the POWER Gt4e with an attachment cable for one display.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
CC	Display adapter cable, contains an integral toroid assembly	58F2903	N/A	2.4	8

FC 2770 (IBM Color Graphics Display Adapter)

The following figure illustrates the Color Graphics Display Adapter with an attachment cable for a color display.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
CC	Display adapter cable, contains an integral toroid assembly	58F2903	N/A	2.4	8

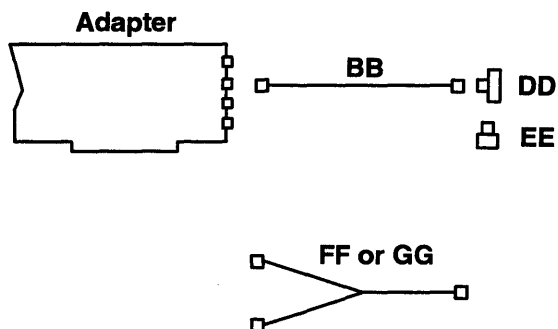
FC 2800 (IBM System/370 Host Interface Adapter)

There are a variety of ways to cable the System/370 Host Interface Adapter to the IBM 5088 or the IBM 6098 Graphics Control Units.

For specific planning and cabling information refer to the *RISC System/6000 5080 Graphics System: Setup, Operations, and Problem Determination Guide*, GA23-2063.

FC 2801, 2802 (IBM 5085 or 5086 Attachment Adapters)

The following figure illustrates the 5085 or 5086 Attachment Adapters with an attachment cable for one IBM 5085 or 5086 Graphics Processor.

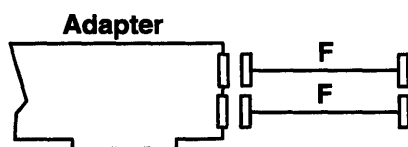


Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
BB	Customer-supplied coaxial cable	6245998	N/A	5	16.4
DD	Coaxial BNC Tee connector	N/A	N/A	N/A	N/A
EE	BNC terminator	6246330	N/A	N/A	N/A
FF	"Y" cable from 5085 Graphics Processor to system unit	6247042	N/A	5	16.4
GG	"Y" cable from 5086 Graphics Processor to system unit	6247041	N/A	5	16.4

For specific planning and cabling information, refer to the *IBM 5080/RISC System/6000 Graphics System: Setup, Operations, and Problem Determination Guide*, GA23-2063.

FC 2810 (IBM Graphics Input Device Adapter)

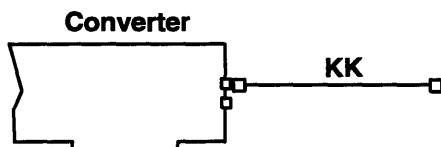
The following figure illustrates the Graphics Input Device Adapter with an attachment cable.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
F	Lighted Programmable Function Keyboard, Dials, or Tablet Attachment Cable, supplied with IBM 6094 Model 10 Dials or IBM 6094 Lighted Programmable Function Keyboard Model 20	6247480	2811	2.1	7

FC 2860 (IBM Serial Optical Channel Converter)

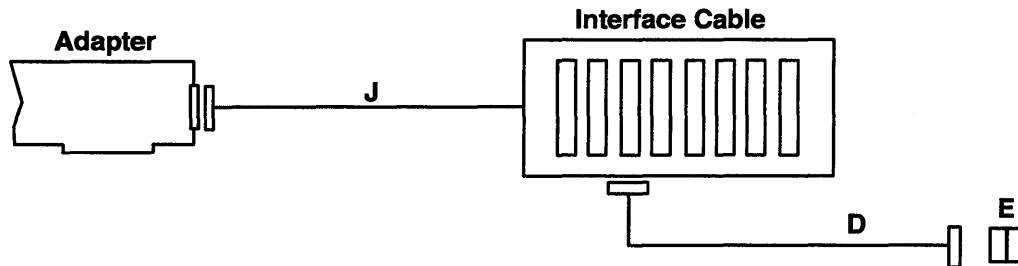
The following figure illustrates the Serial Optical Channel Converter with an attachment cable.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
KK	Optical Channel Converter Cable	46F2440	2866	6	20
		46F2441	2867	10	33
		46F2442	2868	20	65.5
		46F2443	2869	60	197
		46F2444	2870	100	328

FC 2930 (IBM 8-Port Async Adapter-EIA-232)

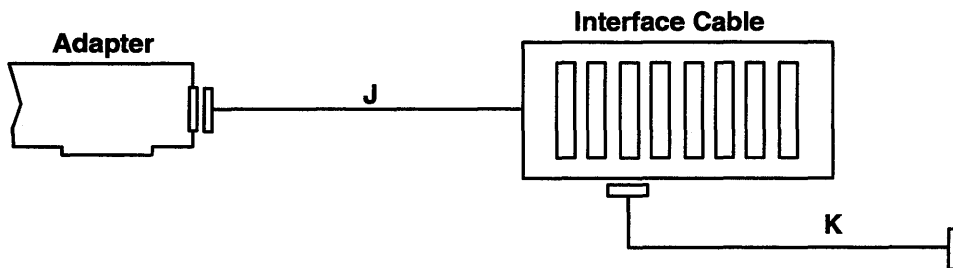
The following figure illustrates the 8-Port Async Adapter-EIA-232 with the IBM Multiport Interface Cable and attachment cables. The cable assembly ports are labeled 0 through 7. Attachment cables can connect to any of the eight ports. In order to make the necessary connections to this adapter, your setup person needs to know the devices and persons assigned to each port.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m	ft
J	Part of cable assembly	00F5524	2995	3	10
D	Async Cable-EIA-232/V.24, if customer-supplied, must meet EIA-232D requirements	6323741	2936	3	10
E	Printer/Terminal Interposer EIA-232	58F2861	2937	N/A	

FC 2940 (IBM 8-Port Async Adapter-EIA-422A)

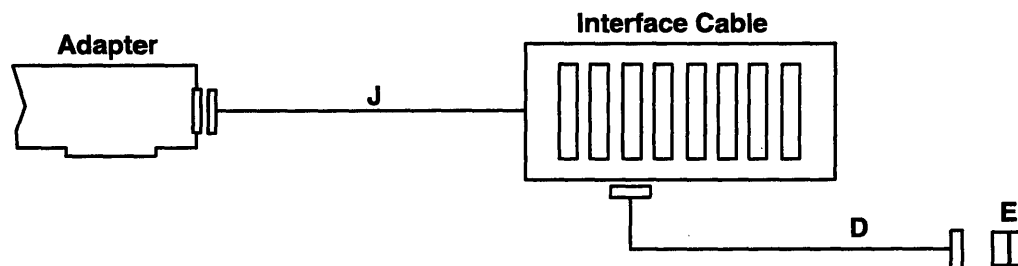
The following figure illustrates the 8-Port Async Adapter-EIA-422A with the IBM Multiport Interface Cable and attachment cables. The cable assembly ports are labeled 0 through 7. Attachment cables can connect to any of the eight ports. In order to make the necessary connections to this adapter, your setup person needs to know the devices and persons assigned to each port.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m	ft
J	Part of cable assembly	00F5524	2995	3	10
K	Terminal Cable-EIA-422A, if customer-supplied, must meet EIA-422A requirements	30F8966	2945	20	65.5

FC 2950 (IBM 8-Port Async Adapter-MIL-STD 188)

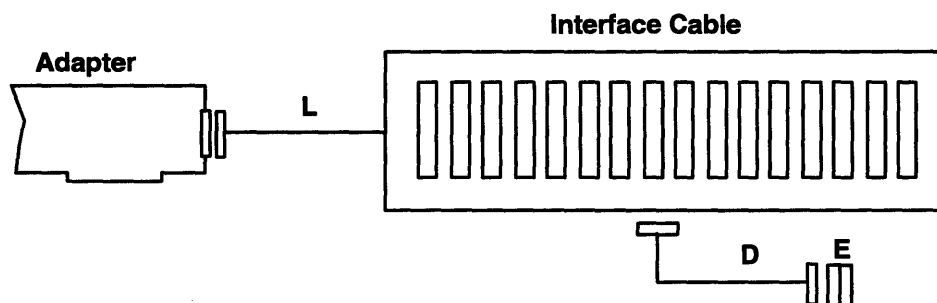
The following figure illustrates the 8-Port Async Adapter-MIL-STD 188 with the IBM Multiport Interface Cable and attachment cables. The cable assembly ports are labeled 0 through 7. Attachment cables can connect to any of the eight ports. In order to make the necessary connections to this adapter, your setup person needs to know the devices and persons assigned to each port.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m	ft
J	Part of cable assembly	00F5524	2995	3	10
D	Async Cable-EIA-232/V.24, if customer-supplied, must meet MIL-STD 188 requirements	6323741	2936	3	10
E	Printer/Terminal Interposer EIA-232	58F2861	2937	N/A	

FC 2955 (IBM 16-Port Async Adapter-EIA-232)

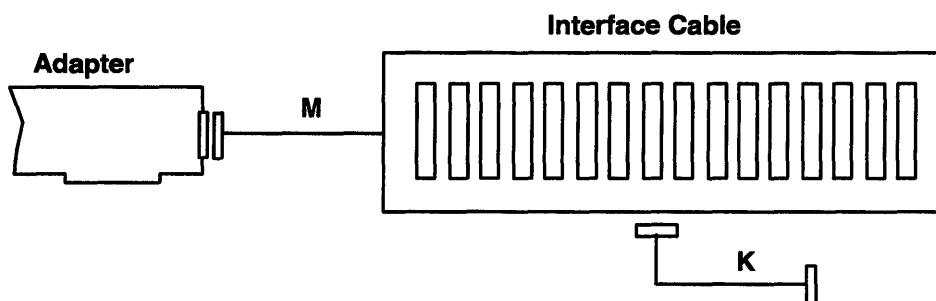
The following figure illustrates the adapter with the IBM 16-Port Interface Cable-EIA-232 and attachment cables. The cable assembly ports are labeled 0 through 15. Attachment cables can connect to any of the 16 ports. In order to make the necessary connections to this adapter, your setup person needs to know the devices and persons assigned to each port.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m	ft
L	Part of interface cable	53F3311	2996	3	10
D	Async Cable EIA-232/V.24, if customer-supplied, must meet EIA-232D requirements	6323741	2936	3	10
E	Printer/Terminal Interposer EIA-232	58F2861	2937	N/A	

FC 2957 (IBM 16-Port Async Adapter-EIA-422A)

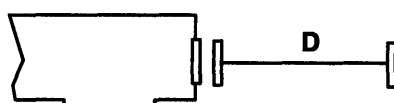
The following figure illustrates the adapter with the IBM 16-Port Interface Cable-EIA-422A and attachment cables. The cable assembly ports are labeled 0 through 15. Attachment cables can connect to any of the 16 ports. In order to make the necessary connections to this adapter, your setup person needs to know the devices and persons assigned to each port.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
M	Part of interface cable	53F3381	2997	3	10
K	Terminal Cable-EIA-422A, if customer-supplied, must meet EIA-422A requirements	30F8966	2945	20	65.5

FC 2959 (IBM Multiprotocol Adapter/A)

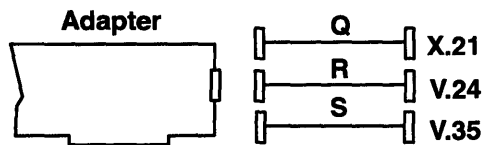
The following figure illustrates the IBM Multiprotocol Adapter/A with an industry standard EIA 232-D with 25-pin D-shell connectors.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
D	Async Cable EIA-232 (If customer-supplied: must meet EIA-232D requirements 50 feet maximum)	6323741	2936	3	10
An EIA-232D Industry-Standard Cable		1502067			

FC 2960 (IBM X.25 Interface Co-Processor/2)

The following figure illustrates the X.25 Interface Co-Processor/2 with attachment cables for each of the three supported interfaces. In order to make the necessary connections to this adapter, your setup person needs to know the type of network interface assigned to each port.



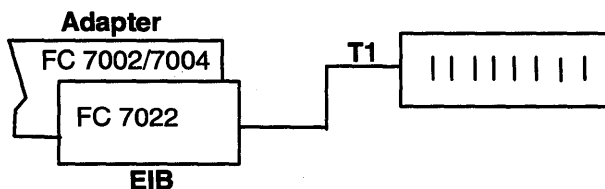
Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m	Length ft
Q	X.25 Attachment Cable-X.21	07F3151	2965	3	10
		53F3926	2976	6	20
R	X.25 Attachment Cable-V.24	07F3161	2966	3	10
		53F3927	2977	6	20
S	X.25 Attachment Cable-V.35	07F3171	2967	3	10
		53F3928	2978	6	20

FC 7002, 7004 IBM Realtime Interface Co-Processor Multiport/2 Adapter/A Configurations

The IBM Realtime Interface Co-processor Multiport/2 Adapter/A must be used with an Electronic Interface Board and the appropriate device interface breakout box (cable). The following sections illustrate the configurations of the IBM Realtime Interface Co-processor Multiport/2 Adapter/A with an Electronic Interface Board (EIB) and device interface breakout box and cable.

IBM 4-Port EIA-232-C Multiport/2 Co-Processor Adapter (FC 7022)

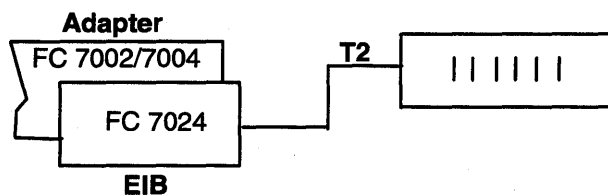
The following figure illustrates the IBM Realtime Interface Co-processor Multiport/2 Adapter/A with the 4-Port EIA-232-C EIB (FC 7022) attached to a device interface breakout box (cable):



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m	Length ft
T1	4/8-Port 232/422 Multiport/2 device interface breakout box (cable)	00F5524	7102	3	10

IBM 6-Port Synchronous EIA-232-C Multiport/2 Co-Processor Adapter (FC 7024)

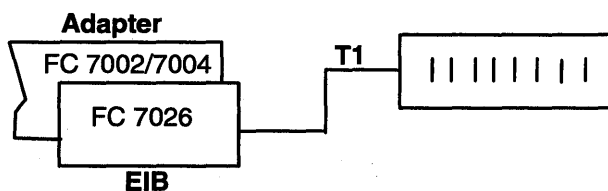
The following figure illustrates the IBM Realtime Interface Co-processor Multiport/2 Adapter/A with the 6-Port Synchronous EIA-232-C EIB (FC 7024) attached to a device interface breakout box (cable):



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
T2	6-Port Sync device interface breakout box with Multiport/2 Cable	15F8867	7104	3	10

IBM 8-Port EIA-232-C Multiport/2 Co-Processor Adapter (FC 7026)

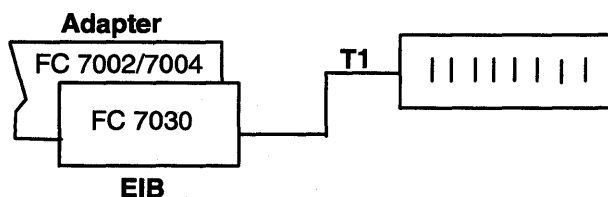
The following figure illustrates the IBM Realtime Interface Co-processor Multiport/2 Adapter/A with the 8-Port EIA-232C EIB (FC 7026) attached to a device interface breakout box (cable):



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
T1	4/8-Port 232/422 Multiport/2 device interface breakout box (Cable)	00F5524	7102	3	10

IBM 4-Port EIA-232-C/4-Port EIA-422A Multiport/2 Co-Processor Adapter (FC 7030)

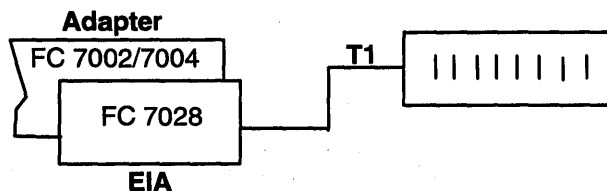
The following figure illustrates the IBM Realtime Interface Co-processor Multiport/2 Adapter/A with the 4-Port EIA-232C/4-Port EIA-422A EIB (FC 7030) attached to a device interface breakout box (cable):



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
T1	4/8-Port 232/422 Multiport/2 device interface breakout box (cable)	00F5524	7102	3	10

IBM 8-Port EIA-422-A Multiport/2 Co-Processor Adapter (FC 7028)

The following figure illustrates the IBM Realtime Interface Co-processor Multiport/2 Adapter/A with the 8-Port EIA-422-A EIB (FC 7028) attached to a device interface breakout box (cable):



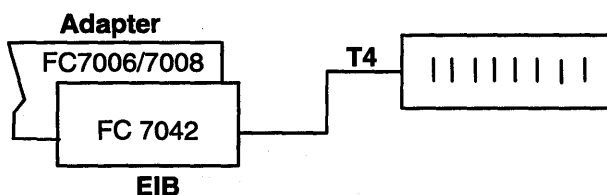
Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
T1	4/8-Port 232/422 Multiport/2 device interface breakout box (cable)	00F5524	7102	3	10

FC 7006, 7008 IBM Realtime Interface Co-Processor Portmaster Adapter/A Configurations

The IBM Realtime Interface Co-processor Portmaster Adapter/A must be used with an Electronic Interface Board and the appropriate device interface breakout box (cable). The following sections illustrate the configurations of the IBM Realtime Interface Co-processor Portmaster Adapter/A with an Electronic Interface Board (EIB) and device interface breakout box and cable.

IBM 8-Port EIA-232-D Portmaster Adapter (FC 7042)

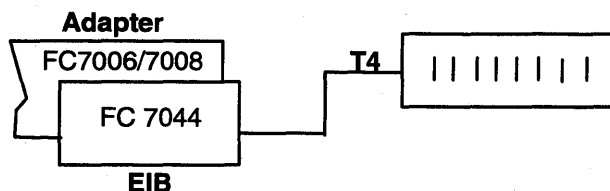
The following figure illustrates the IBM Realtime Interface Co-processor Portmaster Adapter/A with the 8-Port EIA-232-D EIB (FC 7042) attached to a device interface breakout box (cable):



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
T4	8-Port 232/422 Portmaster device interface box (cable)	33F8962	7108	1.2	4

IBM 8-Port EIA-422-A Portmaster Adapter (FC 7044)

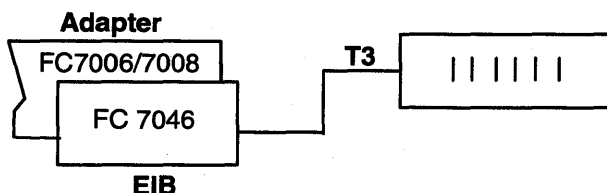
The following figure illustrates the IBM Realtime Interface Co-processor Portmaster Adapter/A with the 8-Port EIA-422-A EIB (FC 7044) attached to a device interface breakout box (cable):



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
T4	8-Port 232/422 Portmaster device interface breakout box (cable)	33F8962	7108	1.2	4

IBM 6-Port V.35 Portmaster Adapter (FC 7046)

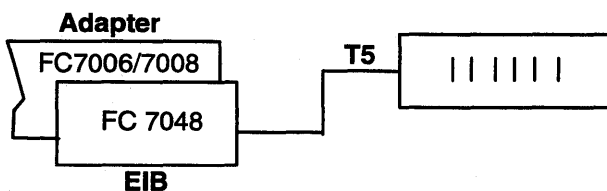
The following figure illustrates the IBM Realtime Interface Co-processor Portmaster Adapter/A with the 6-Port V.35 EIB (FC 7046) attached to a device interface breakout box (cable):



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
T3	6-Port V.35 Portmaster with device interface breakout box (cable)	72F0162	7106	1.2	4

IBM 6-Port X.21 Portmaster Adapter (7048)

The following figure illustrates the IBM Realtime Interface Co-processor Portmaster Adapter/A with the 6-Port X.21 EIB (FC 7048) attached to a device interface breakout box (cable):



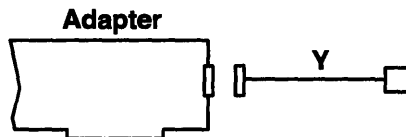
Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
T5	6-Port X.21 Portmaster with device interface breakout box (cable)	04G5501	7106	1.2	4

FC 2970 (IBM Token-Ring High-Performance Network Adapter)

Considerations for Token-Ring applications are found in the following:

- IEEE 802.5 requirements
- *Token-Ring Network Introduction and Planning Guide* (GA27-3677)
- *A Building Planning Guide for Communication Wiring* (G320-8059)
- *IBM Cabling System Planning and Installation Guide* (GA27-3361)
- *Using the IBM Cabling System with Communication Products* (GA27-3620).

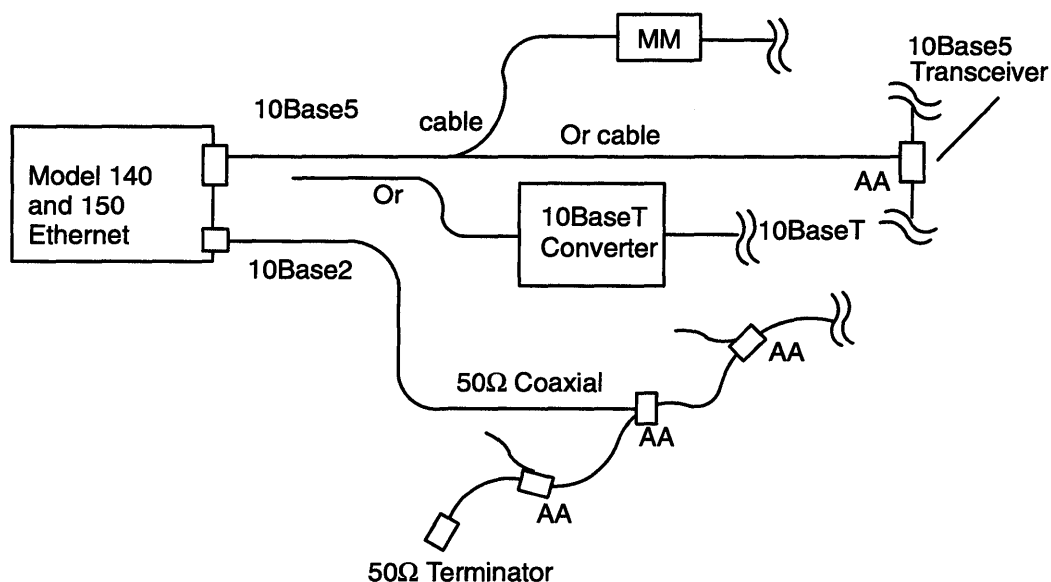
The following figure illustrates the Token-Ring High-Performance Network Adapter with an attachment cable for the Token-Ring LAN (IBM Local Area Network). In order to make the necessary connections to this adapter, your setup person needs to know the devices and persons assigned to each port.



Cable Letter	Cable Name	IBM Part Number	Feature Code	Length	
				m	ft
Y	Token-Ring LAN cable, (shipped with the adapter)	6339098	N/A	3	10
		53F3930	N/A	6	20

7010 Xstation Model 140 and Model 150 Ethernet

The Model 140 and Model 150 integrated Ethernet provides attachments to AUI, BNC, and twisted-pair Ethernet. Twisted-pair Ethernet is achieved by connecting the 10BaseT (twisted-pair) insert directly into the 15 pin D-shell AUI Ethernet port and switching a block of jumpers (7) on the Xstation planar.



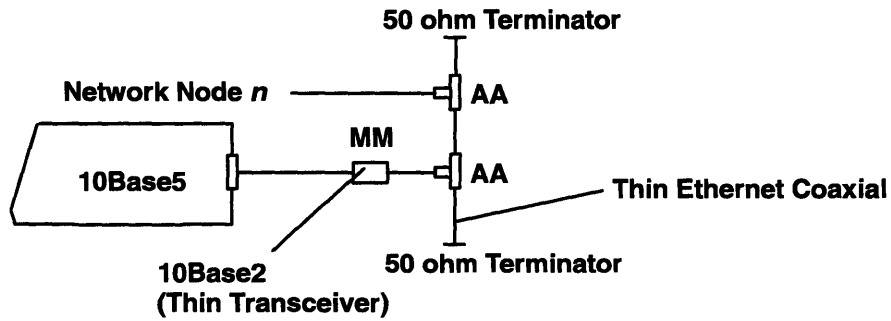
Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
BB	Customer-supplied RJ45 unshielded twisted-pair cable, must meet IEEE 802.3 requirements	N/A	N/A	N/A	N/A
MM	Ethernet 10Base2 Transceiver or Ethernet 10BaseT Transceiver	02G7435 02G7429	4223 4224	1 1	3 3
AA	A coaxial "T" connector, "Y-" or "L-" shaped, is recommended	N/A	N/A	N/A	N/A

Ethernet LAN Adapters

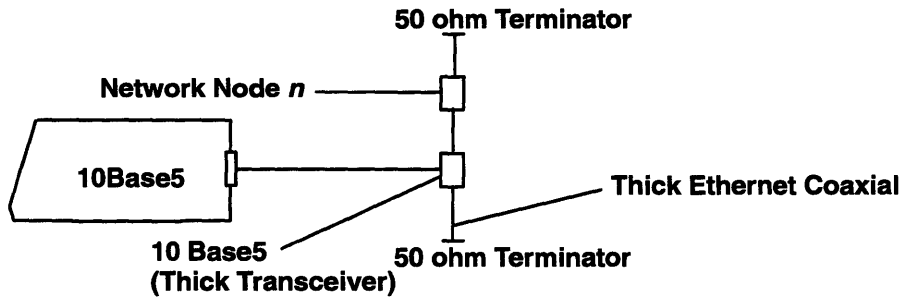
Ethernet cabling varies according to the type of system unit you have.

Models M20, M2A 220, and 230 Integrated Ethernet LAN Adapter

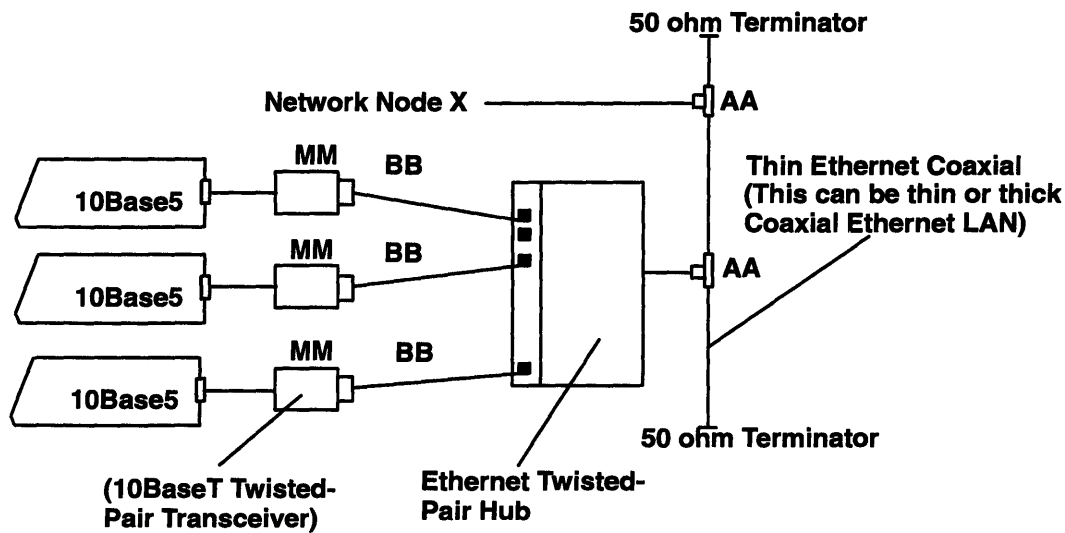
The Models M20, M2A, 220 and 230 Integrated Ethernet adapters feature only an Ethernet standard thick(10Base5) connector. Transceivers must be ordered for use with either thin (10Base2) or twisted-pair (10Base-T). The following is an example of 10Base2:



Note: n is a maximum of 30 nodes per segment (maximum of five segments connected by a repeater).



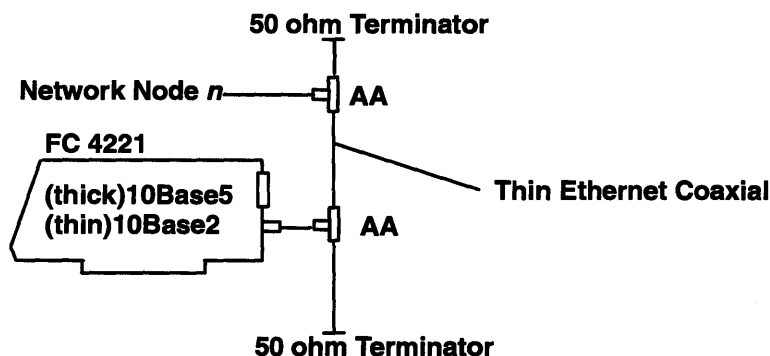
Note: n is a maximum of 100 nodes per segment (maximum of five segments with each segment connected by a repeater).



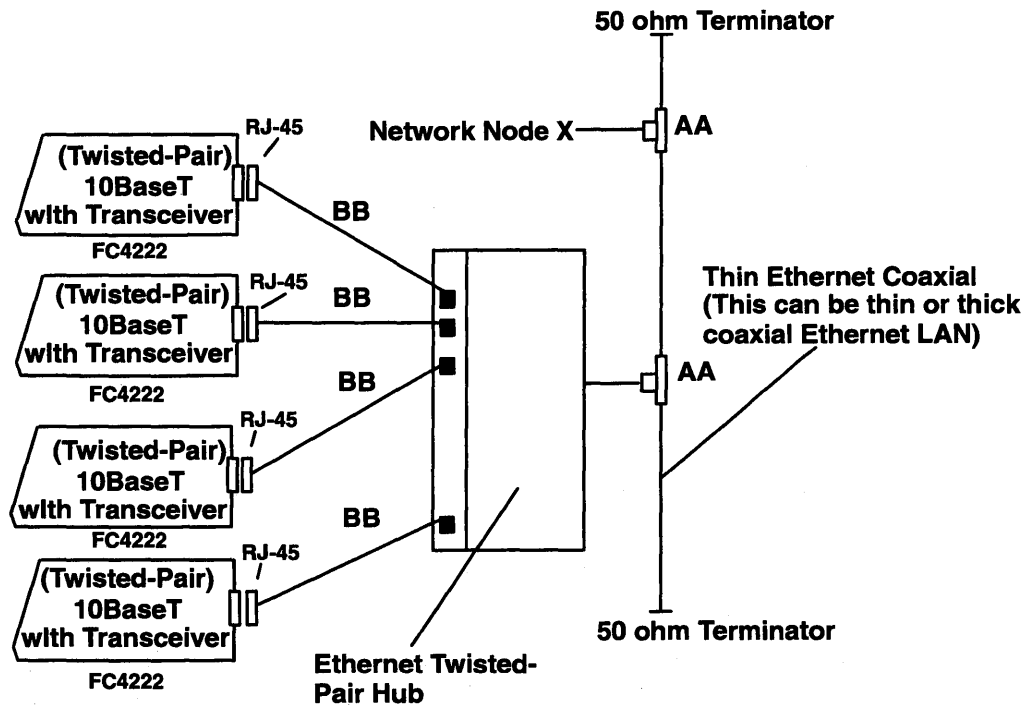
Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
BB	Customer-supplied RJ45 unshielded twisted-pair cable, must meet IEEE 802.3 requirements	N/A	N/A	N/A	N/A
MM	Ethernet 10Base2 Transceiver or Ethernet 10BaseT Transceiver	02G7435 02G7429	4223 4224	1 1	3 3
AA	A coaxial "T" connector, "Y-" or "L-" shaped, is recommended	N/A	N/A	N/A	N/A

Models 340 and 350 Integrated Ethernet LAN Adapter

The integrated Ethernet adapter in the Model 340 and 350 features thick and thin connectors (FC 4221) or twisted-pair (FC 4222). The thick connector is an Ethernet standard connector.



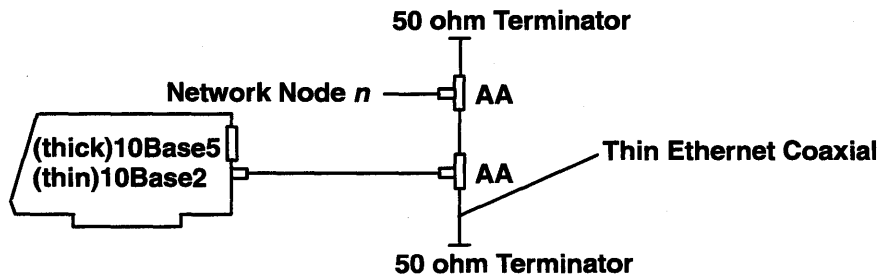
Note: n is a maximum of 30 nodes per segment (maximum of five segments with each segment connected by a repeater).



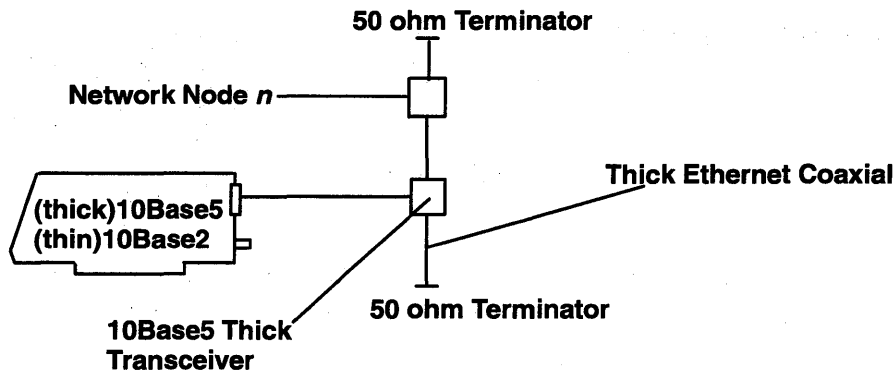
Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length m	ft
AA	A coaxial "T" connector, "Y-" or "L-" shaped, is recommended	N/A	N/A	N/A	N/A
BB	Customer-supplied RJ-45 unshielded twisted-pair cable, must meet IEEE 802.3 requirements	N/A	N/A	N/A	N/A

FC 2980 IBM Ethernet High-Performance LAN Adapter

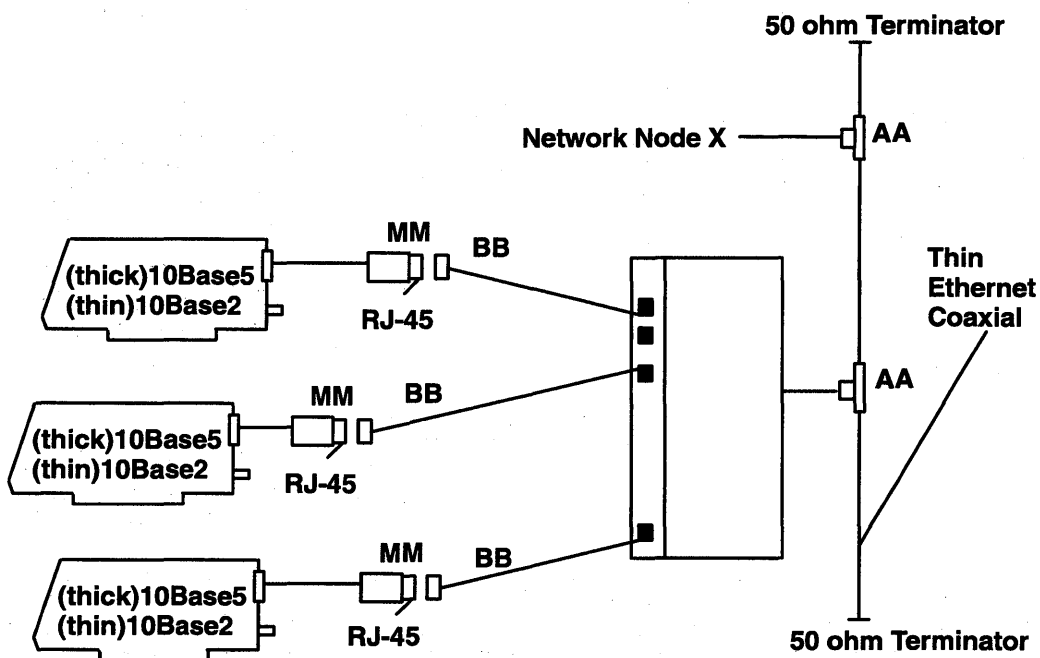
The following figure illustrates the Ethernet High-Performance LAN Adapter with attachment cables. The thick connector is an Ethernet standard connector.



Note: n is a maximum of 30 nodes per segment (maximum of five segments with each segment connected by a repeater).



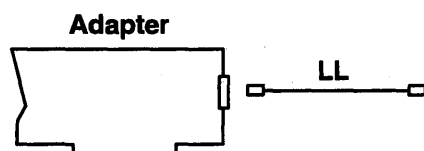
Note: n is a maximum of 100 nodes per segment (maximum of 5 segments with each segment connected by a repeater).



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
AA	A coaxial "T" connector, "Y-" or "L-" shaped, is recommended	N/A	N/A	N/A	
BB	Customer-supplied RJ45 unshielded twisted-pair cable, must meet IEEE 802.3 requirements	N/A	N/A	N/A	
MM	Ethernet 10Base-T Transceiver	02G7429	4224	1	3

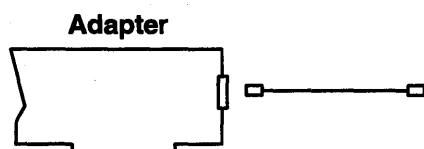
FC 2990 (IBM 3270 Connection Adapter)

The following figure illustrates the 3270 Connection Adapter with attachment cable.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
LL	Customer-supplied coaxial cable	6245998	N/A	3	10

FC 4207 (IBM POWER Gt1x)



AB (POWERdisplays 16 and 19, 5081, 6091

AC (6314, 6317, 6319, 8508, 8517)

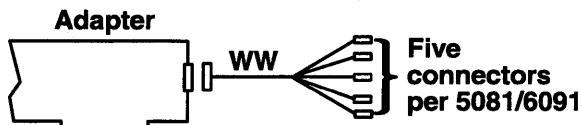
AD POWERdisplay 16s, 1091-051)

Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
AB	Gt1x display cable	09G3539	4214	1.83	6
AC	Gt1x display cable	51G7826	4213	0.3	1
AD	Gt1x to 1091-051	09G3589	9021	1.83	6
AD	Gt1x POWERdisplay 16s	09G3589	4229	1.83	6

Note: See announcement letter for 7011 Model 230 for more information on attachment to Sun and various OEM displays.

FC 4208, 2803 (IBM POWER Gt1, Gt1b)

The following figure illustrates the POWER Gt1 and Gt1b with attachment cable for one display.

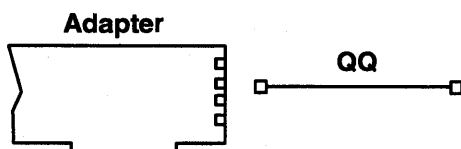


Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
WW	POWER Gt1 Display Adapter Cable, contains an integral toroid assembly.*	58F2902	4217	2	6
AE	Gt1 to 1091-051	09G3588	9020	1.83	6

*The adapter also supports attachment to some IBM PS/2 displays, which have attached cables.

FC 6210 or 6211 (IBM High-Performance Disk Drive Subsystem Adapter)

The following figure illustrates the High-Performance Disk Drive Subsystem Adapter with attachment cable.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
QQ	Serial Link Cable	07G4859	N/A	3	10
		07G4860	N/A	10	33

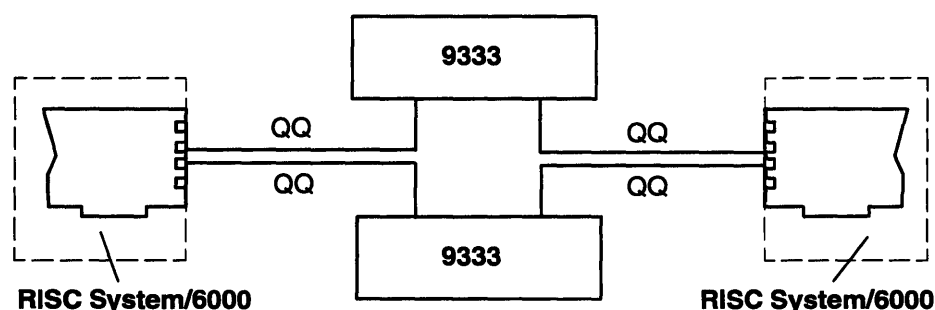
High-Availability Configurations

All 7013 and 7015 RISC System/6000 systems can share an IBM 9333 Model 500 or Model 010 respectively with another RISC System/6000 system. Such configurations may increase system availability and aid in recovery from certain types of hardware, software, and media failures. If one of the systems involved, or a High-Performance Disk Drive Subsystem Adapter fails, the other system can access the shared drives (with appropriate software support). Each 9333 Model 10 or Model 500 supports two independent adapter serial interfaces.

A typical high-availability configuration requires the following:

- Two POWERstations or POWERservers
- One or more High-Performance Disk Drive Subsystem Adapters per host system
- One IBM SCSI High-Performance I/O Controller per system and at least one IBM SCSI disk drive, which can be used to boot the system
- Two or more IBM 9333 Model 010 Drawers or IBM 9333 Model 500 Subsystems (this allows mirroring of data files across drawers or subsystems, preventing a single point of failure)

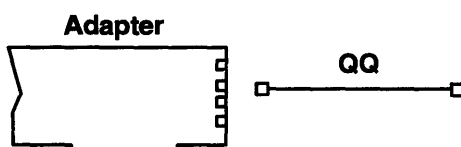
- Sufficient 10-m (33-ft) Serial Link Cables to connect system units with drawers or subsystems.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
QQ	Serial Link Cable	07G4859	N/A	3	10
		07G4860	N/A	10	33

FC 6212 (IBM High-Performance Subsystem Adapter 40/80MB/Sec)

The following figure illustrates the High-Performance Subsystem Adapter 40/80MB/Sec with attachment cable.



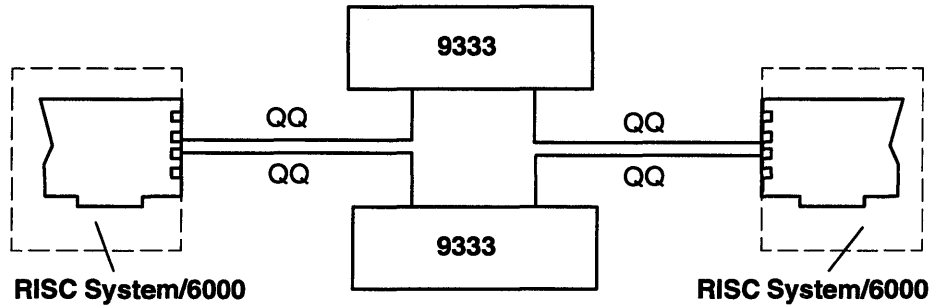
Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
QQ	Serial Link Cable	07G4859	N/A	3	10
		07G4860	N/A	10	33

High-Availability Configurations

All 7013 and 7015 RISC System/6000 systems can share an IBM 9333 Model 501 or Model 011 respectively with another RISC System/6000 system. Such configurations may increase system availability and aid in recovery from certain types of hardware, software, and media failures. If one of the systems involved, or a High-Performance Disk Drive Subsystem Adapter fails, the other system can access the shared drives (with appropriate software support). Each 9333 Model 011 or Model 501 supports two independent adapter serial interfaces.

A typical high-availability configuration requires the following:

- Two POWERstations or POWERservers
- One or more High-Performance Disk Drive Subsystem Adapters per host system
- One IBM SCSI High-Performance I/O Controller per system and at least one IBM SCSI disk drive, which can be used to boot the system
- Two or more IBM 9333 Model 011 Drawers or IBM 9333 Model 501 Subsystems (this allows mirroring of data files across drawers or subsystems, preventing a single point of failure)
- Sufficient 10-m (33-ft) Serial Link Cables to connect system units with drawers or subsystems.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
QQ	Serial Link Cable	07G4859	N/A	3	10
		07G4860	N/A	10	33

The figure above shows two systems attached to a 9333 Subsystem Model 011 or 501. The Model 9333 Models 011 and 501 can attach to up to eight system units at the same time.

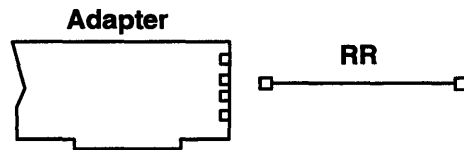
Cabling Considerations for 9333 High Performance Disk Drive Subsystems

The following points should be considered when connecting the 9333 High Performance Disk Drive Subsystem to the system:

- Up to four subsystems can be connected to a High Performance Disk Drive Subsystem Adapter, providing up to sixteen disk drives per adapter. The subsystems cannot be daisy chained, and there are no external terminators to be installed or removed.
- 9333 Model 010 Drawer subsystems can be installed in the same rack as the CPU drawer, or in a nearby expansion rack.
- There are no address switches in 9333 subsystems. The addresses are determined only by the way in which the subsystems are connected to the system.
- 9333 subsystems can be connected to two High Performance Disk Drive Subsystem Adapters, either in the same or in different system units. If a subsystem is connected to two adapters in two different systems, ensure that the address of that subsystem on each of the systems is carefully recorded to avoid confusion between similarly addressed devices on the two systems. Information regarding the checking of disk drive addresses in 9333 subsystems can be found in 9333 documentation.

FC 6300 (IBM 9291/9295 Digital Trunk Adapter)

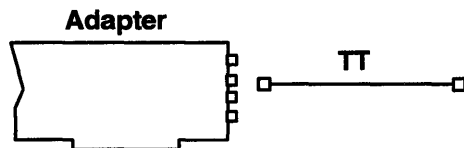
The following figure illustrates the 9291/9295 Digital Trunk Adapter with an attachment cable.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
RR	Cable to 9291/9295 assembly, provided with VPACK	34F0873	N/A	2	6.6

FC 6301 (IBM M-Audio Capture and Playback Adapter)

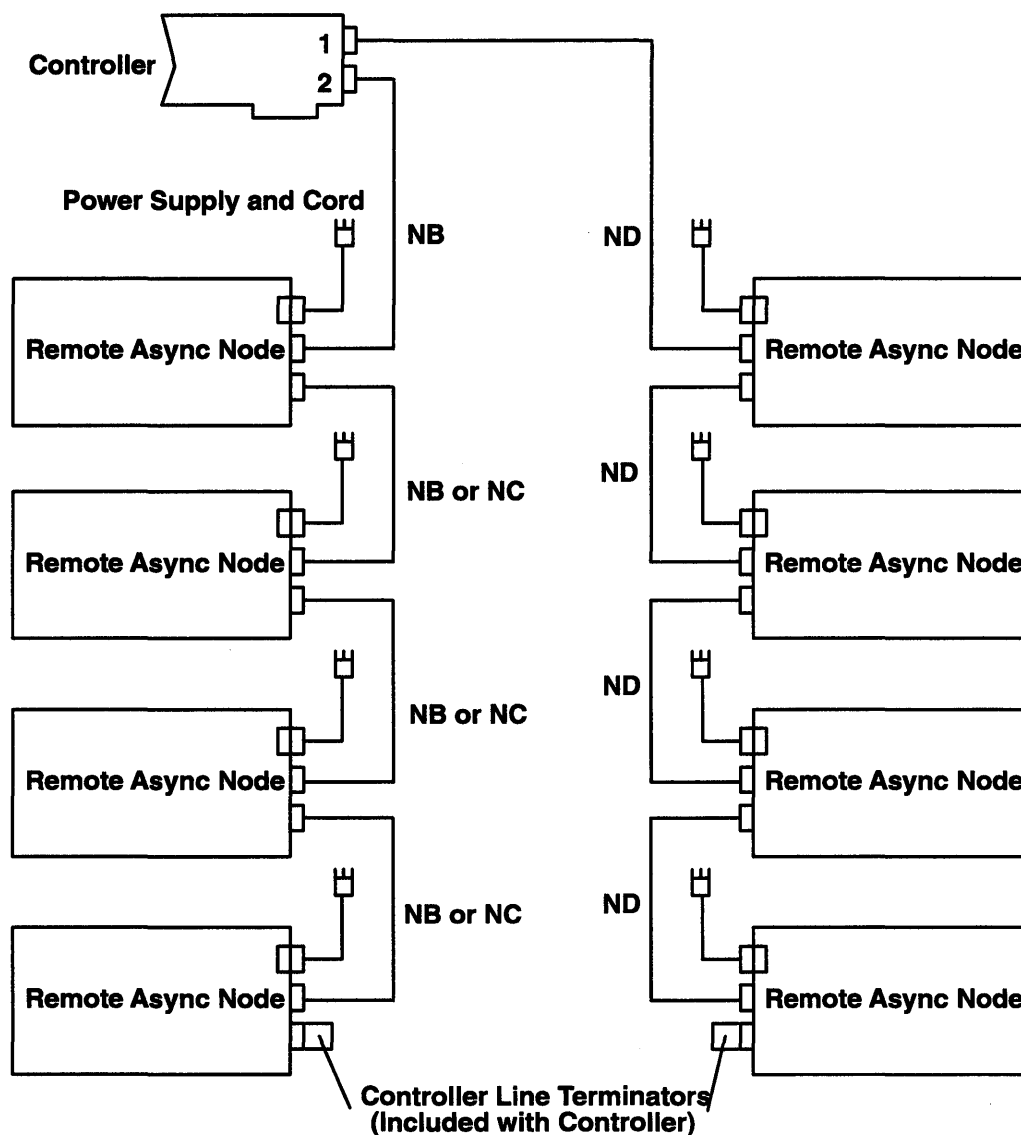
The following figure illustrates the M-Audio Capture and Playback Adapter with an attachment cable.



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
TT	Customer-supplied cable	N/A	N/A		

FC 8128 (IBM 128-Port Async Controller)

A number of cabling scenarios are possible when installing this feature. The following figure shows a typical configuration in which eight IBM Remote Async Nodes are attached to the 128-Port Async Controller using both 4-wire and 8-wire direct cabling. Note that in the figure below, cables NB and NC are available from IBM, the ND cable in the configuration below is a customer-supplied cable.



The 128-Port Async Controller supports up to four Remote Async Nodes on each controller line using the following attachment options:

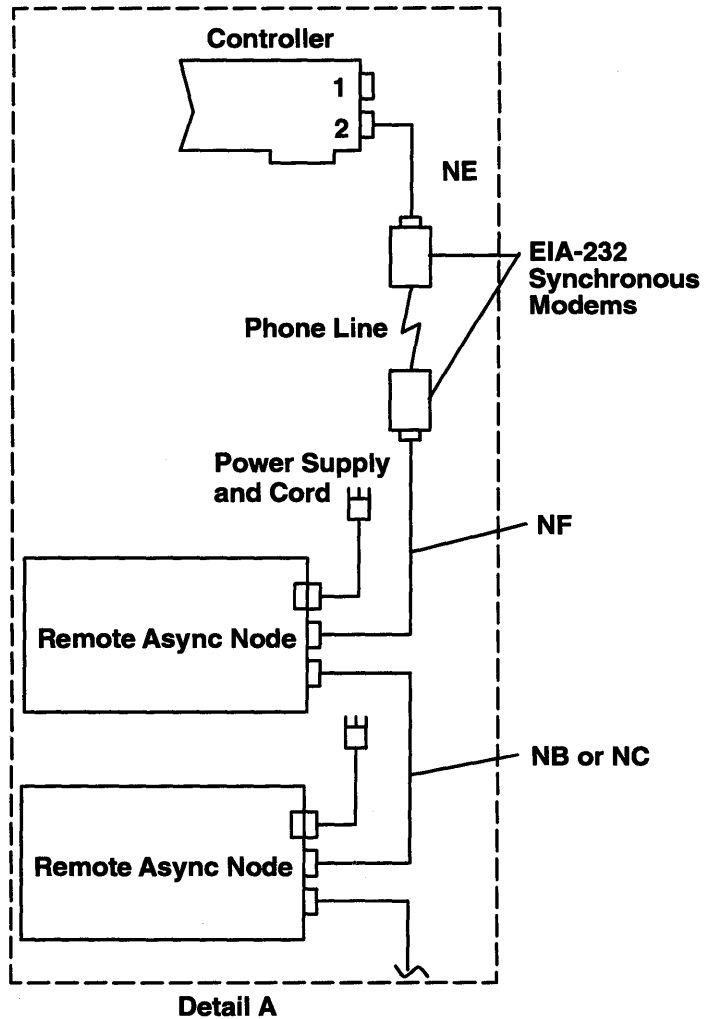
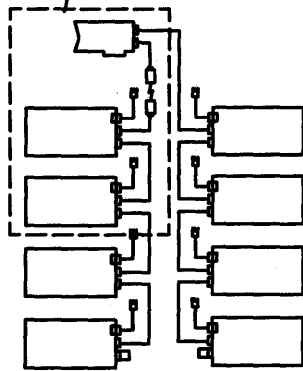
Attachment Method	Recommended Environment	Benefit
Eight-wire direct	Moderate to heavy async data loads	Maximum performance
Four-wire direct	Light async data loads	Reduced cabling cost
Synchronous modems	Light async data loads	Remote location

Any combination of 8-wire cabling and synchronous modems can be used to attach Remote Async Nodes. However, 4-wire cabling cannot be used in combination with 8-wire cabling or synchronous modems on the same controller line.

The following two figures illustrate the use of EIA-232 and EIA-422 synchronous modems in typical 128-Port Async Controller configurations. Note that each configuration requires a unique set of customer-supplied cables for modem attachment (NE, NF, NG, and NH). Only one pair of synchronous modems is allowed per line.

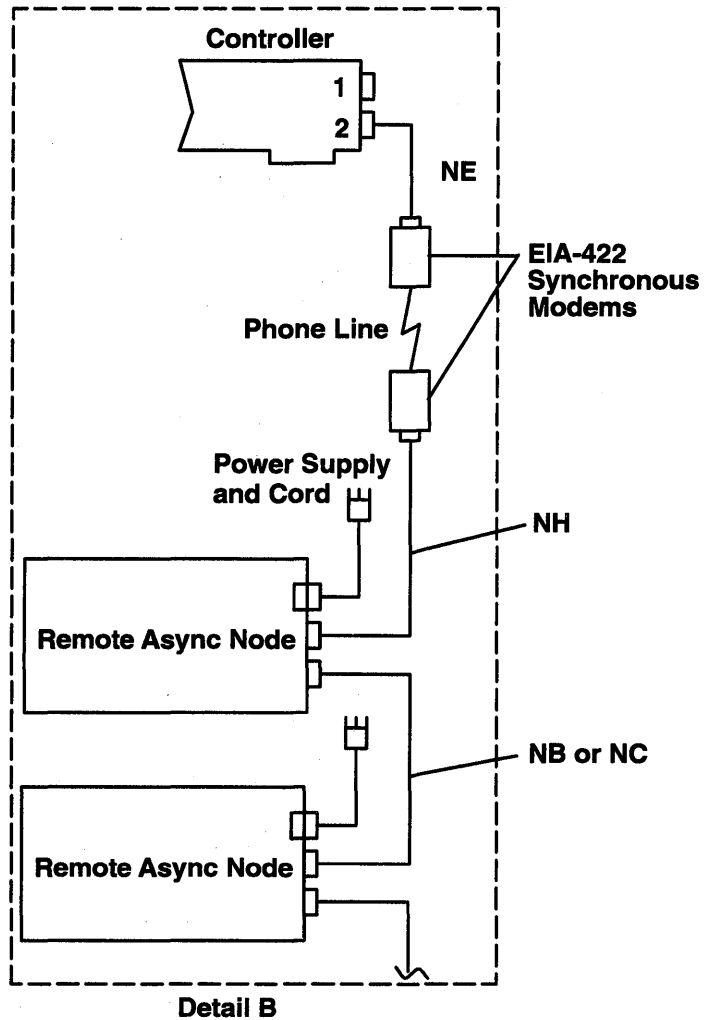
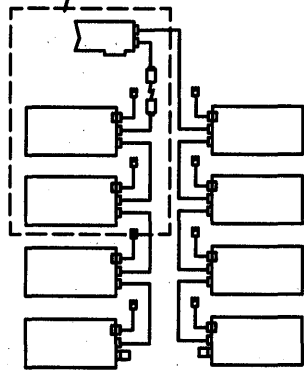
**A Simplified Overview
of the IBM 128-Port
Async Controller**

(See Detail A)

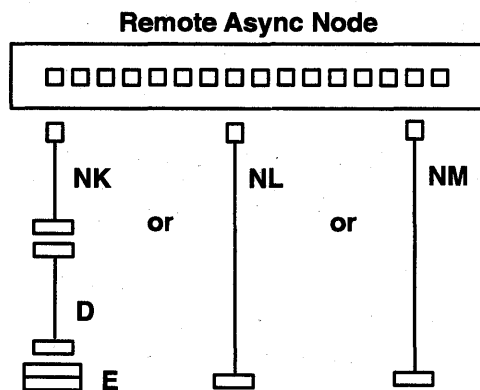


**A Simplified Overview
of the IBM 128-Port
Async Controller**

(See Detail B)



A choice of cables can be attached to any of the 16 Remote Async Node ports, as shown in the following illustration. These ports are labeled 0 through 15 and accept 4-, 6-, 8-, and 10-pin RJ-type connectors.

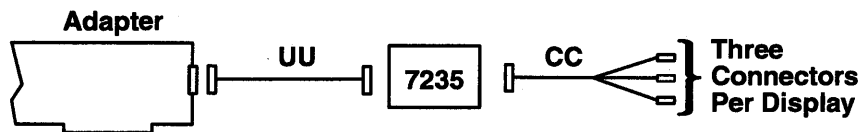


In order to make the necessary connections to the Remote Async Node, the system administrator must know the type of device that is being configured and its port location on the Remote Async Node. The cable planning charts on page 1-214 can help you make these assignments.

Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
NC	128-Port Async Controller Cable, 8-wire	43G0936	8132	.23	.75
NB	128-Port Async Controller Cable, 8-wire	43G0937	8131	4.57	15
ND	128-Port Async Controller Cable, 4-wire, customer-supplied	N/A	N/A	N/A	
NE	128-Port Async Controller EIA-232 Modem Cable, system, customer-supplied	N/A	N/A	N/A	
NF	128-Port Async Controller EIA-232 Modem Cable, device, customer-supplied	N/A	N/A	N/A	
NG	128-Port Async Controller EIA-422 Modem Cable, system, customer-supplied	N/A	N/A	N/A	
NH	128-Port Async Controller EIA-422 Modem Cable, device, customer-supplied	N/A	N/A	N/A	
NK	RJ45 to DB25 Converter Cables (four provided with each order)	43G0935	8133	0.61	2
D	Async Cable-EIA-232/V.24, if customer-supplied, must meet EIA-232D requirements.	6323741	2936	3	10
E	Printer/Terminal Interposer EIA-232	58F2861	2937	N/A	
NL	Cable directly wires RJ45 to a DB25 connector for attachment to a terminal or printer; customer-supplied, must meet EIA-232D electrical requirements	N/A	N/A	N/A	
NM	Cable directly wires RJ45 to a DB25 connector for attachment to a modem; customer-supplied, must meet EIA-232D electrical requirements	N/A	N/A	N/A	

IBM POWER GTO Accelerator Adapter

The following figure shows the POWER GTO Accelerator Adapter attached to the 7235 POWER GTO to the RISC System/6000 system unit.

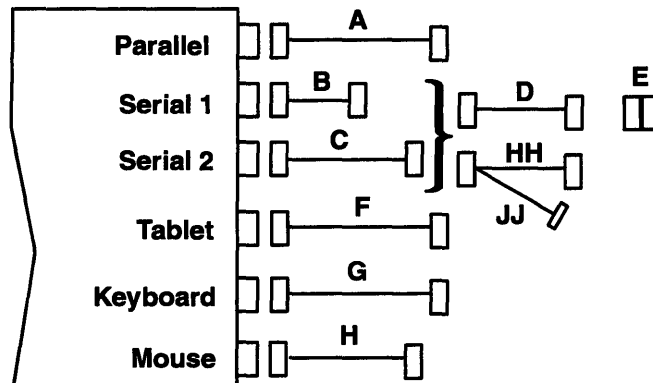


Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
UU	7235 Signal Cable, used to attach system unit to 7235 (supplied with 7235)	74F3102	N/A	2.0	6.5
CC	Display Adapter Cable, contains an integral toroid assembly (cable supplied with 7235)	58F2903	N/A	2.4	8

IBM Standard I/O Adapter

The following figure illustrates the Standard I/O Adapter with attachment cables. The 7015 POWERserver supports serial port 1 (S1), serial port 2 (S2), and parallel port (P) only. In order to make the necessary connections to this planar, your setup person needs to know the devices and persons assigned to each port.

Standard I/O



Cable Letter	Cable Name/Description	IBM Part Number	Feature Code	Length	
				m	ft
A	PC Parallel Printer Cable	1525612 09F5544	3100	3 5	10 16.4
B	Serial port jumper cable, two provided with each system unit (except for Models M20, M2A, 220, 230, 250, 340, and 350, which do not require them)	00G0943	N/A	0.09	0.33
C	Serial port jumper cable for 7015, two provided with each system unit	59F4533	N/A	3	10
D	Async Cable-EIA-232/V.24, if customer-supplied, must meet EIA-232D requirements	6323741	2936	3	10
HH	6094 Attachment Cable, attaches to both device and power cable (JJ)	39F8228	4060	1.8	6
JJ	Power cable for 6094, attaches to display	39F8302	4061	1.8	6
E	Printer/Terminal Interposer-232	58F2861	2937	N/A	
F	Tablet cable, supplied with tablet	6247480	2811	2.1	7
G	Keyboard cable, supplied with keyboard	N/A	N/A	3	10
H	Mouse cable, supplied with mouse	N/A	N/A	2.75	9

Cabling SCSI Devices

The following sections describe the cabling, termination, and addressing for all SCSI controllers. The table below shows where in this section to look for information on cabling specific SCSI configurations:

Note: To understand the cabling for the SCSI controllers read "General SCSI Considerations" below, and then refer to the sections described in the table for information on specific SCSI cabling configurations.

Reference and Page	ID	Standard on Model	Type	Description	Label	FC Availability
"Cabling for FC 2828, 2829 and 2835 SCSI I/O Adapter" on page 1-193	SCSI-1	7013/520 thru 560 7015/930/950 7016/all models	Single-ended	Adapter	4-1	2828, 2835, 2829
"Cabling for the SCSI-1 Integrated Controller in Models 7012, 7013, and 7015" on page 1-200	SCSI-1	7012/340 thru 375 7013/570 thru 590 7015/970 thru 990	Single-ended	Integrated	N/A	N/A
"Integrated Single-Ended SCSI Controller Cabling for Models M20 and 2XX" on page 1-202	SCSI-1	7008M20 7011/220/23 (all)	Single-ended	Integrated	N/A	N/A
"Cabling for FC 2831 and 2410 SCSI-2 Single-Ended Adapter" on page 1-204	SCSI-2	7013/580 7015/970/980	Single-ended	Adapter	4-4	2410, 2831
"Cabling for the SCSI-2 Differential I/O Controller FC 2420" on page 1-207	SCSI-2	N/A	Differential	Adapter	4-2	2420

General SCSI Considerations

SCSI Terminators

- There must be exactly two terminators on the SCSI bus, and they must be located at each extreme end of the bus.
- If the configuration consists of an adapter with external devices only (not high availability), connect the internal card edge terminator on the top edge connector of the SCSI-1 or SCSI-2 single-ended controller. Connect the SCSI device terminator (D-shell connector) to the last device on the bus.

- If the configuration consists of internal devices only, connect the external terminator to the external connector of the SCSI adapter. The internal cable contains a built-in terminator on the other end of the cable.
- If the configuration uses both internal and external devices, connect a terminator on the last external device on the bus, and use the internal cable with the built-in terminator.
- Some devices may be shipped with terminators attached. Remove these terminators.

SCSI Bus Lengths General

SCSI bus length is defined as the distance between terminators at either end of a SCSI bus.

- For configurations using both internal and external cabling, length restrictions refer to the length from the end of the internal cable (terminator) to the terminator on the last device on the external bus.
- Devices such as the 9334/010 or 9334/500 require a dedicated external SCSI-1 or SCSI-2 controller.
- Devices which have two SCSI connectors have internal cabling which must be included when calculating total cable length. When connecting these devices, connect one cable into one connector and the other cable (or terminator, if this is the last device on the bus) to the second connector. Do not “piggy back” the second cable/terminator onto the first as you would on a device with only one connector.

SCSI Device Addresses

The SCSI-1 and SCSI-2 single-ended controllers support a maximum of eight SCSI addresses, including devices and adapters.

- For any single-adapter configuration, a maximum of seven additional devices are permitted, providing that the supported configuration specific bus lengths are not exceeded. Other restrictions such as bus length may further limit the number of allowable devices.
- For two-adapter configurations (high availability), up to six devices are permitted, providing that the supported configuration specific bus lengths are not exceeded. Other restrictions such as bus length may further limit the number of allowable devices.
- The default ID of the SCSI controller in a single controller configuration is 7. All devices on that bus must have a unique ID from 0 to 6; two different devices may not have the same SCSI ID. In the high-availability configuration, the second controller will have an ID of 6; the remaining SCSI device IDs will be 0 to 5.

Note: The SCSI address switch for each device must be set while power to the system unit is off. The operating system determines the system configuration during IPL. If a SCSI address is changed after the operating system is loaded, the operating system must be stopped and loaded again to have the correct configuration.

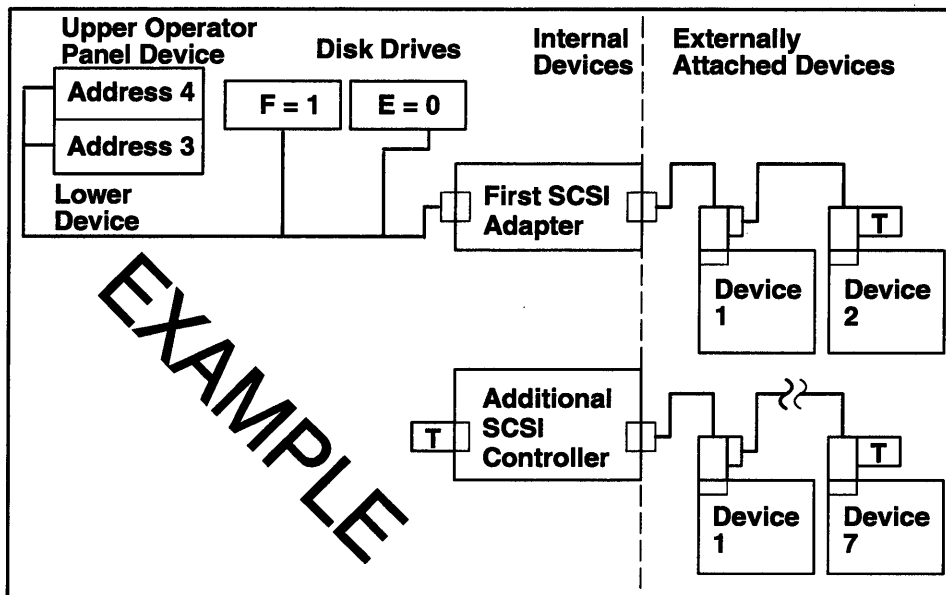
To determine what SCSI addresses are available you must know what SCSI addresses are already in use. The following are several ways to do this:

- If the system is operational and the AIX Version 3 operating system is loaded and configured, use the **lsdev -C -s scsi** command to list all of the devices in the Customized Devices Object Class. The list shows *name*, *status*, *location* (the software location code), and the *description*.
- Use customer planning information supplied by the customer.
- Use the “About Your Machine” listing that was shipped with your system unit to determine the internal device addresses.

- Physically check each device address.

The following example shows how Appendix A of the *Installation and Service Guide* would be filled out for a system unit with:

- One disk drive
- One front panel device
- One device attached to the SCSI controller in slot 8
- Two devices attached to the SCSI controller in slot 7.



Overload Protection

The SCSI I/O controllers contain circuitry to protect themselves and connected devices from current overload. The SCSI-1 controller uses either a fuse that must be replaced after failure, or a Positive Temperature Coefficient (PTC) resistor that resets within five minutes after the overload cause is removed. SCSI-2 controllers all use a PTC.

- Do not connect or disconnect any SCSI device while power is on. Such "hot plugging" is forbidden because this practice may blow the controller fuse, trip the PTC resistor, corrupt data or permanently damage SCSI controller chips in adapters or devices.
- The fuse or PTC on a SCSI I/O controller protects the external and internal SCSI bus. The fuse may be blown or the PTC tripped by a defective cable, terminator, or device attached to the controller, but not by a defective controller.

Controller Access Time

- Consider the following to keep controller access time within reasonable limits:
 - Have the disk being backed up and the backup device on separate controllers
 - Attach four or fewer disk drives to the same SCSI-1 controller and six or fewer disk drives to a SCSI-2 controller.
 - If possible have the high-usage disk drives (such as operating system drives) on the same controller with low-usage devices to improve access time.

Cabling for the FC 2828, 2829, and 2835 SCSI I/O Adapter

To understand the cabling for this adapter, read "General SCSI Considerations" on page 1-190, then read the following for specific information.

As Required Engineering Change (EC)

For all machines shipped prior to 16 May 1991 (and for some machines shipped between 17 May and 14 June 1991), any SCSI-1 High Performance Controller that has an internally installed SCSI device connected to the card edge connector can only have two externally attached devices. If the customer having this configuration wishes to use more than two external devices, an "As Required Engineering Change (EC)" which provides a new internal cable is available at no charge upon request by service personnel. The Customer Engineer should search RETAIN under the appropriate machine type for "FPT CABLE" to obtain the correct Field Bill of Materials for the EC.

This EC is not required if only external devices are attached.

Grey-colored internal terminators crimped on the internal SCSI ribbon cable indicate that the EC has been installed; pre-EC terminators are blue or black.

SCSI-1 Single-Ended Cable Lengths Using this Adapter

SCSI-1 single-ended cabling should be accomplished in accordance with the following criteria and machine type specifications.

Note: SCSI cable length maximums must be carefully observed to avoid transmission line mismatch problems.

- The maximum length of a chain of SCSI devices and cables is 6 m (19.7 feet). This maximum length includes the internal cabling of a device that has two connectors.
- For systems with both internal and external cables, the 6 m (19.7 feet) maximum is defined as the distance from the internal terminator to the external terminator.

The following tables and examples are provided as an aid to properly cable a SCSI bus.

Cable and Terminator Tables for SCSI-1 I/O Adapter

System Internal Cable Lengths

F/C	Machine Type	Notes	Cable Length (meters)
2828	7012/320/32H	DASD SCSI Option	0.5
*	7013 thru 560	First card, with internal devices	3.67
2829	7013	Second card, with internal devices	1.56
*	7015/930/950	Length inside CPU drawer	1.2
*	7016		2.37
* These cables ship with the base machine and cannot be ordered separately			

Note: All internal cables are terminated at the end of the cable farthest from the SCSI adapter.

Adapter-to-First Device Cables

Cable Description	Part Number	Cable Length (meters)
Adapter-to-first device	70F9733 31F4221	1.57
Adapter-to-first device (where first device has two SCSI connectors.)	33F4606	1.5
Adapter-to-9334/500	07G5143 07G5127	2.38 1.57
Adapter-to-9334/010 or media drawer (7015 system)	71F1072 31F4223 71F1073 31F4224	2.38 1.48
Adapter-to-1/2 inch, 9-track tape drive (7015 system)	00G1278	4.75

Note: The 70F9733, 71F1072, and 71F1073 cables are no longer manufactured, but are still usable, the 70F9733 is limited to four external devices maximum.

Device Internal Cable Lengths

Device	Cable Length (meters)
7203, 7204, 7206,-1 7207, 7208, 7209-1, 7210	Negligible
7206-5, 7209-2	.25
9348	Negligible
9334-010	1.0
9334-500	2.66
7015 Media Drawer	3.1

Device-to-Device Cables

Cable Description	Part Number	Cable Length (meters)
Device-to-device	70F9734 / 31F4222	0.66
Device-to-device (where second device has two SCSI connectors)	33F4607	0.7

Note: The 70F9734 cable is no longer manufactured, but still usable if no more than 4 external devices are attached.

Terminators for Use with this Adapter

Card Edge

A SCSI card edge terminator is required when no internal cable or SCSI device is attached. This terminator is installed on the top edge of the SCSI card.

Terminator Description	Part Number
Card edge, non-FPT	70F9900
Card edge, FPT-3	00G0972

Note: The 70F9900 terminator is no longer manufactured, but still usable if no more than 2 external devices are attached.

Card External

A SCSI card external terminator is required when no external cable or SCSI device is attached. This terminator attaches to the SCSI card external bus connector on the rear edge of the SCSI card.

Terminator Description	Part Number
60-pin, external	15F6743

Single-Ended External

A SCSI external terminator is required when any external cable or SCSI device is attached. This terminator is attached at the external end of the bus.

Terminator Description	Part Number
50-pin, Lo-density, external, non-FPT	70F9671
50-pin, Lo-density, external, FPT-3	00G0968

Note: The 70F9671 terminator is no longer manufactured, but still usable if no more than 4 external devices are attached.

Cabling Examples

Example 1:

Connect a 7207 1/4-inch tape drive and a 7010 CD-ROM to a 7013/530 system; there are two SCSI devices inside the covers, already connected to the SCSI card.

Solution:

From the tables on the previous two pages, the following cable lengths are obtained:

- System Internal SCSI Cable Lengths: internal length 3.67 m
- SCSI Device Internal Cable Length: 7207 internal length negligible
- SCSI Device Internal Cable Length: 7210 internal length negligible
- SCSI External Cable length: adapter-to-first-device (31F4221) 1.57 m
- SCSI External Cable length: device-to-device (31F4222) 0.66 m

Total **5.90 m**

The internal cable has a terminator on the end of the bus, internal to the system unit. Terminator (P/N 00G0968) should be connected after the last external device to terminate the other end of the bus. Note that a third external device cannot be connected on this bus, as the length would exceed 6 meters.

Example 2:

Connect a 7207 1/4 inch tape drive and a 7210 CD-ROM to a 7013/530 system that already has seven devices connected to the base SCSI adapter.

Solution:

Add another adapter as follows. From the SCSI length tables on previous pages, the following cable lengths are obtained:

- SCSI Device Internal Cable Length: 7207 internal length negligible
- SCSI Device Internal Cable Length: 7210 internal length negligible
- SCSI External Cable length:adapter-to-first-device (31F4221) 1.57 m
- SCSI External Cable length:device-to-device (31F4222) 0.66 m

Total **2.23 m**

A SCSI card edge terminator (PN 00G0972) should be attached to the top edge connector of a second SCSI card, in order to terminate the end of the bus at the SCSI adapter. Terminator (PN 00G0968) should be connected after the last external device to terminate the other end of the bus.

Example 3:

Add an internal 400MB disk drive to a 7012/32H system that already has one internal 320MB disk drive on the SCSI bus.

Solution:

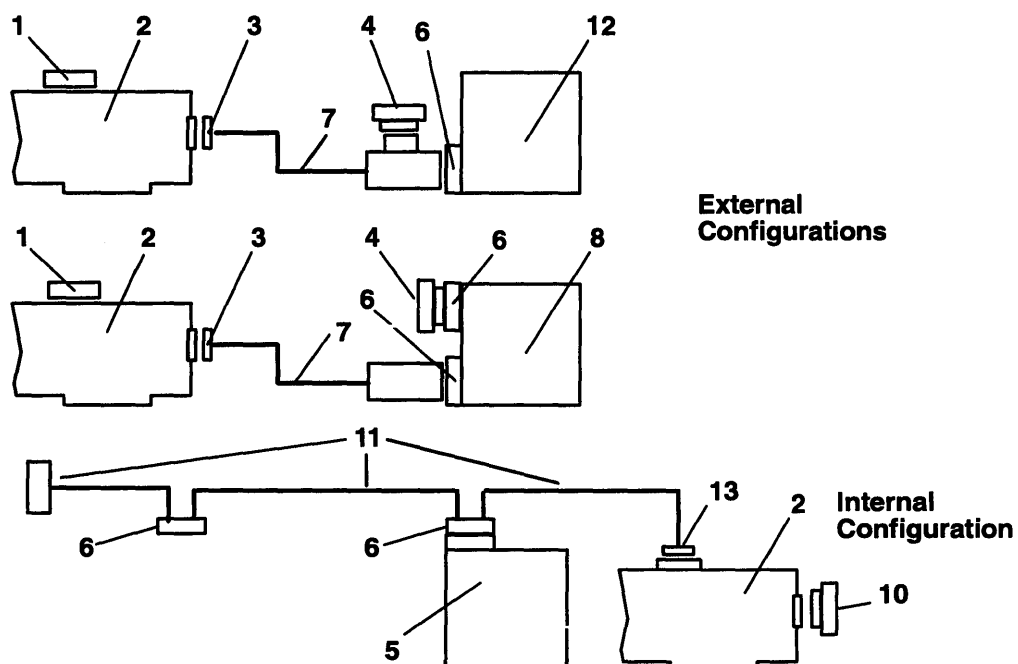
- Connect the 400 MB disk drive to the SCSI bus.

From the SCSI length tables on previous pages, the following cable lengths are obtained:

- SCSI Device Internal Cable Length: 7012 internal length 0.5 m

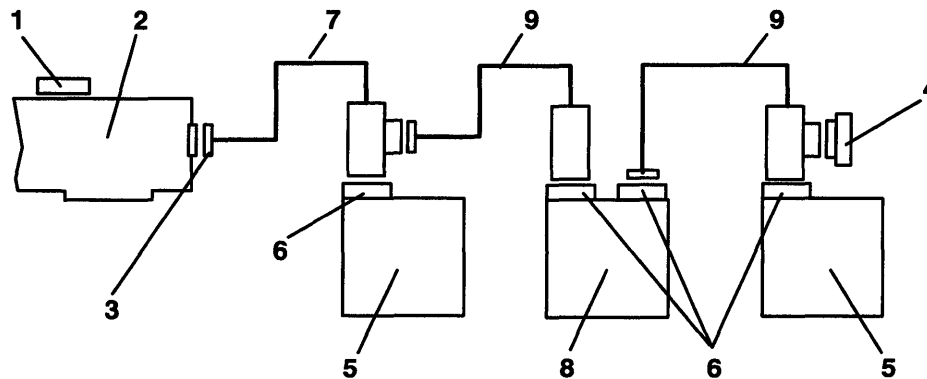
Total **0.5 m**

The internal cable already should have a terminator on the bus end that is internal to the system unit. A second terminator (PN 15F6743) should already be connected to the SCSI adapter external bus connector terminating the other end of the bus.



Item Number	SCSI-1 Part Number	SCSI-2 Part Number	Description
1	00G0972	00G0972	50-position card edge terminator
2	51G9425	52G7509	SCSI-1 I/O controller (labelled "4-1" near external connector) SCSI-2 I/O controller (labelled "4-4" near external connector)
3			60-position SCSI-1/50-position SCSI-2 connector
4	00G0968	51G7736	50-position SCSI external terminator
5			One-connector type SCSI internal device
6			50-position SCSI connector
7	31F4221 70F9733 33F4606	32G0397 8191425	Dual-connector type controller-to-device SCSI cable (attaches single connector devices) Single-connector type controller-to-device cable (attaches two connector devices)
8			Two-connector type SCSI device
10	15F6743	51G7737	60-position SCSI external terminator 50-position high density SCSI-2 single-ended external terminator
11		51G8571	Internal SCSI disk drive cable and terminator assembly
12			One-connector type SCSI device
13			50-position card edge SCSI connector

Attaching Multiple SCSI Single-Ended Devices



Item Number	SCSI-1 Part Number	SCSI-2 Part Number	Description
1	00G0972	00G0972	50-position card edge terminator
2	51G9425	52G7509	SCSI-1 I/O controller (labelled "4-1" near external connector) SCSI-2 I/O controller (labelled "4-4" near external connector)
3			60-position SCSI-1 connector/50-position SCSI-2 connector
4	00G0968	51G7736	50-position SCSI terminator
5			One-connector type SCSI device
6			50-position SCSI connector
7	31F4221 or 70F9733	32G0397	Dual-connector type controller-to-device SCSI cable
8			Two-connector type SCSI device
9	31F4222	31F4222	Dual-connector type device-to-device cable (attaches single connector devices)
	33F4607	33F4607	Single-connector type device-to-device cable (attaches two connector devices)

High Availability SCSI-1 and SCSI-2 Single-Ended Cabling

Warning: The following high availability section describes supported hardware configurations. These configurations may not be supported by your software application. Be sure that your software application supports these configurations before attempting to use.

Note: The passthrough terminator cables are no longer available except through RPQ 8A0759 for the SCSI-1 adapter and RPQ 8A0758 for the SCSI-2 adapter. The recommended high availability SCSI configuration is the SCSI-2 differential controller and subsystems.

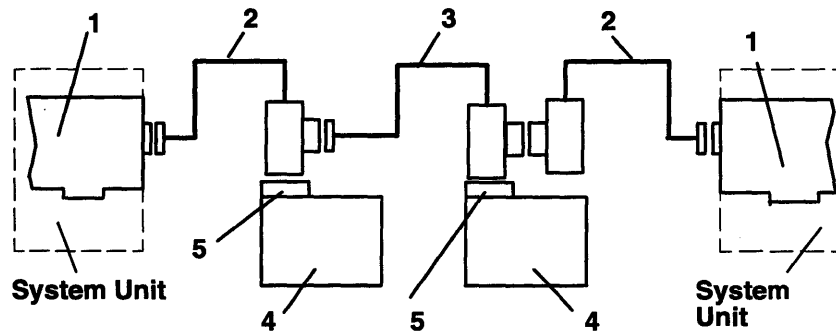
The high-availability configuration has important prerequisites:

- No internal SCSI single-ended devices may be attached to either SCSI single-ended controller used in the high-availability configuration.

Note: 1. The integrated SCSI function found on the planar of certain models such as 7012/340/350 cannot be used for high availability. To achieve high availability on these models, separate SCSI-1 Single-Ended, SCSI-2 single-ended, or SCSI-2 differential controllers must be used.
2. The recommended high availability SCSI configuration is the SCSI-2 differential controller and differential subsystem.

- No internal terminators may be used on either SCSI single-ended I/O Controller.
- Jumper J1(2 pieces) or P3 (2 pieces) must be moved, refer to Chapter 8.
- A Passthrough Terminator, Controller-to-First-Device Cable must be used from each SCSI single-ended I/O Controller to the first SCSI single-ended device at each end of the device chain. (Only available through RPQ.)
- High-availability software must be installed on both system units.
- A specific device-to-device cable (listed below) should be used.

Note: The termination of the SCSI single-ended chain is continued by the Passthrough Terminator in the event that one host becomes disconnected.



Item Number	SCSI-1 Part Number	SCSI-2 Part Number	Description
1	51G9425	52G7509	SCSI-1 I/O controller (labelled "4-1" near external connector) SCSI-2 I/O controller (labelled "4-4" near external connector)
2	00G0959 70F9171	51G8568 N/A	Passthrough Terminator, Controller-to-First-Device Cable 9334/500 attachment
3	31F4222	31F4222	Device-to-device cable for single connector devices
4			One-connector type SCSI device
5			50-position SCSI connector

Cabling for the SCSI-1 Integrated Controller in Models 7012, 7013, and 7015

To understand the cabling for this controller, read the "General SCSI Considerations" on page 1-190, then read the following for specific information.

SCSI-1 Single-Ended Cable Lengths Using this Controller

SCSI-1 single-ended cabling should be accomplished in accordance with the following criteria and machine type specifications.

Note: SCSI cable length maximums must be carefully observed to avoid transmission line mismatch problems.

- The maximum length of a chain of SCSI devices and cables is 6 m (19.7 feet). This maximum length includes the internal cabling of a device that has two connectors.
- For systems with both internal and external cables, the 6 m (19.7 feet) maximum is defined as the distance from the internal terminator to the external terminator.

The following tables and examples are provided as an aid to properly cable a SCSI bus.

Cable and Terminator Tables for the SCSI-1 Integrated Controller

System Internal Cable Lengths

F/C	Machine Type	Notes	Cable Length (meters)
*	7012/340 to 375	Integrated SCSI cable	0.5
*	7013/(all) 570 and 580 shipped before 7/1/93	Integrated SCSI cable	3.45
*	7013 /580 shipped after 7/1/93	Integrated SCSI cable	1.95
*	7015/970/980	Integrated SCSI cable externally attaches to media drawer	1.57
*	7015/97B/98B	No external connection to integrated SCSI	
* These cables ship with the base machine and cannot be ordered separately			

Note: These cables are shipped with the base machine and cannot be ordered separately.

Controller-to-First Device Cables

Cable Description	Part Number	Cable Length (meters)
Integrated SCSI adapter-to-single connector device	32G0397	1.57
Integrated SCSI adapter-to-dual connector device	8191425	1.5
Integrated SCSI adapter-to-9334/500	70F9188	1.48

Device Internal Cable Lengths

Refer to "Device Internal Cable Lengths" on page 1-194.

Device-to-Device Cables

Refer to "Device-to-Device Cables" on page 1-194.

Terminators for Use with this Controller

This controller has an internal terminator built into the controller.

Controller Output Connector

A SCSI card external terminator is required when no external cable or SCSI device is attached. This terminator attaches to the SCSI controller external bus connector on the rear edge of the box.

Terminator Description	Part Number
50-pin, hi-density, external, FPT-3	00G2223

SCSI-1 Single-Ended External

A SCSI external terminator is required when any external cable or SCSI device is attached. This terminator is attached at the external end of the bus.

Terminator Description	Part Number
50-pin, lo-density, external, non-FPT	70F9671
50-pin, lo-density, external, FPT-3	00G0968

Cable Examples for the Integrated Controller

The cable examples in "Cabling Examples" beginning on page 1-195 can be used as reference for device-to-device attachment. Substitute the above integrated controller-to-device cables for the adapter-to-device cables in the examples.

High Availability SCSI-1 Integrated Controller

High availability is not supported with this controller.

Integrated Single-Ended SCSI Controller Cabling for Models M20 and 2XX

Note: To understand the cabling for this controller, "General SCSI Considerations" on page 1-190, then read the following for specific information.

SCSI-1 Single-Ended Cable Lengths

SCSI-1 single-ended cabling should be accomplished in accordance with the following criteria and machine type specifications.

Note: SCSI cable length maximums must be carefully observed to avoid transmission line mismatch problems.

- The maximum length of a chain of SCSI devices and cables is 6 m (19.7 feet). This maximum length includes the internal cabling of a device that has two connectors.
- For systems with both internal and external cables, the 6 m (19.7 feet) maximum is defined as the distance from the internal terminator to the external terminator.

The following tables and examples are provided as an aid to properly cable a SCSI bus.

Cable and Terminator Tables for SCSI-1 Controller

System Internal Cable Lengths

Machine Type	Notes	Cable Length (meters)
7008/M20	Integrated SCSI length	Negligible
7011/220/230	Integrated SCSI length	.2

Note: These controllers have an internal terminator.

Controller-to-First Device Cables

Cable Description	Part Number	Cable Length (meters)
Integrated SCSI adapter-to-device	32G0397	1.57
Integrated SCSI adapter-to-9334/500 *	70F9188	1.48
Integrated adapter-to-first device (where first device has two SCSI connectors)	8191425	1.5
* Not supported on 7008 Model M20		

Device Internal Cable Lengths

Refer to "Device Internal Cable Lengths" on page 1-194.

Device-to-Device Cables

Refer to "Device-to-Device Cables" on page 1-194.

Terminators for Use with this Controller

The single-ended controller has an internal terminator built into the controller.

Controller Output Connector

A SCSI card external terminator is required when DASD is installed in the box and no external cable or SCSI device is attached. This terminator attaches to the SCSI controller external bus connector on the rear edge of the box.

Terminator Description	Part Number
50-pin, hi-density, external, FPT-18	43G0378
50-pin, hi-density, external, FPT-18+	51G7737

Note: The 43G0378 terminator is no longer manufactured, but still usable with this controller.

SCSI-1 Single-Ended External

A SCSI external terminator is required when any external cable or SCSI device is attached. This terminator is attached at the external end of the bus.

Terminator Description	Part Number
50-pin, lo-density, external, FPT-18	43G0467
50-pin, lo-density, external, FPT-18+	51G7736

Note: The 43G0467 terminator is no longer manufactured, but still usable with this controller.

Cabling Examples

The cable examples in "Cabling Examples" on page 1-195 can be used for reference for device-to-device attachment. Substitute the above integrated controller-to-device cables for the adapter-to-device cables in the examples. Use the above terminators in place of the terminators in the examples

High Availability with the 7008/7011 Integrated Controller

High availability is not supported with this controller.

SCSI-2 Single-Ended Cable Lengths (Model 250)

For the Model 250 integrated SCSI-2 controller, when using SCSI-2 devices, a maximum of three external devices and 3.0 m total cable length is recommended.

If only SCSI-1 devices are attached externally, the standard SCSI limits of six external devices and 6.0 m total cable length applies.

Cabling for the F/C 2831 and 2410 SCSI-2 Single-Ended Adapter

To understand the cabling for this adapter, "General SCSI Considerations" on page 1-190, then read the following for specific information.

SCSI-2 Single-Ended Cable Lengths using this Adapter

SCSI-2 single-ended cabling should be accomplished in accordance with the following criteria and machine type specifications.

Note: SCSI-2 single-ended cable length maximums must be carefully observed to avoid transmission line mismatch problems.

- The maximum length of a chain of SCSI-2 single-ended devices and cables is dependent on specific supported configurations. This maximum length includes the internal cabling of a device that has two connectors. Special cases are covered in the following tables.
- Due to increased maximum data rates, the SCSI-2 single-ended bus length is specified to be 3m (9.9 ft.) maximum. However, certain configurations with specialized termination allow longer bus lengths. The following configurations are the only supported configurations that are longer than 3 meters.

Note: The following referenced part numbers are cables only; terminators may also be required.

- A SCSI bus length of 3.75m (12.3 ft) may be achieved using Part Numbers 32G0397 and 31F4222 to attach up to four external, supported SCSI devices to a 7011, 7012 or 7013 system.
- A SCSI bus length of 4.25m (13.9 ft) may be achieved using Part Numbers 51G8571, 32G0397 and 31F4222 to attach up to two supported SCSI devices on the external bus, together with up to six SCSI devices on the internal bus, to a 7013 system.
- A SCSI bus length of 5.2m (17.1 ft) may be achieved using Part Number 45G2858 to attach a 9334/500 to a 7011, 7012 or 7013 system.
- A SCSI bus length of 5.9m (19.3 ft) may be achieved using Part Number 51G8569 to attach a 9334/010 to a 7015 system.

Note: The total number of attached SCSI devices must be seven or fewer.

- For systems with both internal and external cables, the maximum length is defined as the distance from the internal terminator to the external terminator.

The following tables and examples are provided as an aid to properly cable a SCSI-2 single-ended bus.

Cable and Terminator Tables for SCSI-2 Single-Ended Adapter

System Internal Cable Lengths

The SCSI-2 Single-Ended adapter is included with the 7013/580's that were shipped after 7/1/93. Only two external devices can be attached to this adapter using part numbers 32G0397 and 31F4222 to attach the external devices.

The SCSI-2 Single-Ended adapter is included with all 970B's and 980B's to drive the internal DASD, no external devices can be attached to this adapter.

Adapter-to-Device Cables

Cable Description	Part Number	Cable Length (meters)
Adapter-to-single connector device	32G0397	1.57
Adapter-to-dual connector device	8191425	1.57
Adapter-to-9334/010	51G8569	4.75
Adapter-to-9334/500	45G2858	2.38

Device Internal Cable Lengths

Refer to "Device Internal Cable Lengths" on page 1-194.

Device-to-Device Cables

Refer to "Device-to-Device Cables" on page 1-194.

Terminators for Use with this Adapter

Card Edge

A SCSI-2 single-ended card edge terminator is required when no internal cable is attached. This terminator is installed on the top edge of the SCSI card.

Terminator Description	Part Number
Card edge, FPT-3	00G0972

Card External

A SCSI-2 single-ended card external terminator is required when no external cable is attached. This terminator attaches to the SCSI single-ended card external bus connector on the rear edge of the SCSI-2 single-ended card.

Note: The SCSI-2 single-ended controller is labelled "4-4" near the external connector, and the terminator is labelled "SCSI-2 SE".

Terminator Description	Part Number
50-pin, hi-density, external, FPT-18+	51G7737

External Terminator

A SCSI-2 single-ended external terminator is required when any external cable or device is attached (except for 9334/010 attachment or high-availability configuration). This terminator is attached at the external end of the bus, and is labelled "SCSI-2 SE".

Terminator Description	Part Number
50-pin, hi-density, external, FPT-18+	51G7736

Cabling Examples for the SCSI-2 Single-Ended Adapter

Refer to "Cabling Examples" on page 1-195 for cabling examples.

High Availability SCSI-2 Single-Ended Cabling

Warning: The following high availability section describes supported hardware configurations. These configurations may not be supported by your software application. Be sure that your software application supports these configurations before attempting to use.

Note: Passthrough terminator cables are no longer available except through RPQ 8A0758 for the SCSI-2 adapter. The recommended high availability SCSI configuration is the SCSI-2 differential controller and subsystems.

The high-availability configuration has important prerequisites:

- No internal SCSI single-ended devices may be attached to either SCSI single-ended controller used in the high-availability configuration.
- No internal terminators may be used on either SCSI single-ended I/O Controller.
- Jumper P3 (2 pieces) must be moved, refer to Chapter 8.
- High-availability software must be installed on both system units.

Note: The only approved high-availability configuration using this adapter is using the following cables to attach up to two external supported SCSI devices that are shared by any two 7011, 7012, or 7013 systems.

Cable Description	Part Number	Cable Length (meters)
Passthrough terminator, adapter-to-device	51G8568	1.57
Device-to-device	31F4222	.66

Note: See cabling examples in "High Availability SCSI-1 and SCSI-2 Single-Ended Cabling" on page 1-198.

Cabling for the SCSI-2 Differential I/O Controller FC 2420

SCSI-2 I/O controllers may be of single-ended or differential SCSI bus signal driver design. Differential devices can not be attached to single-ended controllers, and single-ended devices can not be attached to differential controllers.

Identifying SCSI-2 Differential Components

Note: SCSI adapters, devices, enclosures and cables which are not marked with reference to single-ended or differential design should be considered as single-ended.

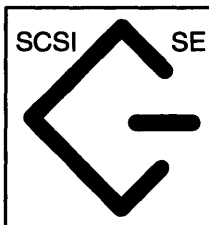
IBM Components

IBM SCSI-2 differential adapters, devices, enclosures and cables will be designated by specific labelling:

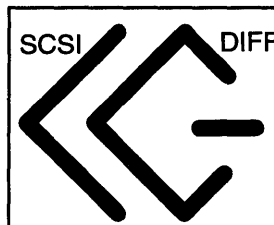
- Differential adapters will be labelled on the rear adapter bracket with the word "Differential SCSI."
- Differential devices will be labelled with the word "Differential SCSI" as near as possible to the appropriate connector.
- Differential enclosures will be labelled with the word "Differential SCSI" as near as possible to appropriate internal and external connectors. Differential enclosure access panels that must be removed to allow access to devices or cables will be labelled with the words, "All internal SCSI devices and cables are Differential SCSI."

OEM Components

OEM devices may be marked with one of the following ANSI icons:



Single-Ended



Differential

SCSI-2 Differential Bus Lengths using this Adapter

Differential SCSI bus length is defined as the distance between terminators at either end of a SCSI bus.

- For configurations using external cabling, length restrictions refer to the length from the built-in differential terminator on the adapter to the last device on the external SCSI bus.
- Devices that have two connectors, such as the 9334/011/501, have internal cabling which must be included when calculating total cable length. When connecting these devices, connect one cable into one connector and the other cable (or terminator, if this is the last device on the bus) to the second connector. Up to two 9334/011/501 may be daisy-chained on one SCSI-2 differential bus.
- The SCSI-2 differential bus length should be no longer than 19m (62.3 ft.).

Cable and Terminator Tables for the SCSI-2 Differential Adapter

SCSI-2 differential cabling should be accomplished in accordance with the following criteria and machine type specifications.

SCSI-2 differential cable length maximums must be carefully observed to avoid transmission line mismatch problems.

Use the 2xxx feature codes listed in the following tables to order just the cable or terminator. Use the 9xxx feature codes to order a cable or terminator as a select feature for the SCSI device you are attaching. These cables and terminator may also be provided with other feature codes.

The following tables and examples are provided as an aid to properly cable a SCSI-2 differential bus.

System Differential Internal Cable Lengths

There are no internal connections to the SCSI-2 differential adapter

Adapter-to-First Device Cables

F/C	Cable Description	Part Number	Cable Length (meters)
2921 2923	Adapter-to- 9334/011 or 7204 differential device	67G0593 95X2494	4.75 8.0
2931 2933 2935 2937	Adapter-to-9334/501 deskside differential unit	70F9188 45G2858 67G0566 67G0562	1.48 2.38 4.75 8.0
2901/9201 2902/9202 2905/9205 2912/9212 2914/9214 2918/9218 2919	Adapter-to-7135 Interposer-required to attach 7135 adapter cable to the adapter	61G1259 61G1260 61G1261 61G1262 61G1263 61G1264 61G8323	.6 2.4 4.5 12.0 14.0 18.0 N/A

Differential Device Internal Cable Lengths

Device	Cable Length (meters)
9334/011	3.1
9334/501	2.66
7204	0.25

Differential Device-to-Device Cables

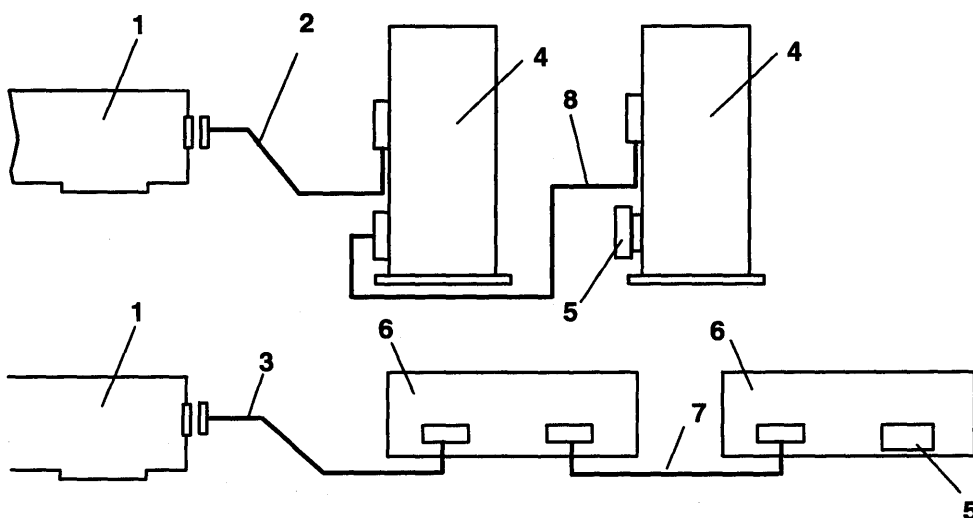
F/C	Cable Description	Part Number	Cable Length (meters)
2848/9134	7204-to-7204 differential device cable	74G8511	.66
2925/9225	9334/011 or 7204-to-9334/011 or 7204 differential device	95X2492	2.0
2939/9239	9334/501 deskside differential unit-to-9334/501 deskside differential unit cable	95X2498	2.0

Differential Terminators for Use with this Adapter

- Each end of the bus must have a terminator; that is, there are only two terminators on the bus.
- The SCSI-2 Differential High Performance External I/O Controller (Type 4-2) has built-in, removable differential terminators. One additional external terminator is required when connecting devices to the external SCSI bus.

F/C	Terminator Description	Part Number
2847/ 9133	50-pin, lo-density, external	79X3795

Cabling Examples for the SCSI-2 Differential Adapter



Item Number	Part Number	Description
1	43G0176	SCSI-2 Differential High Performance External I/O Controller (Type 4-2 labelled "4-2" near the external connector)
2	67G0566 67G0562	Adapter-to-first 9334/501 deskside differential unit, 4.75 m Adapter-to-first 9334/501 deskside differential unit, 8.0 m
3	67G0593 95X2494	Adapter-to-9334/011 or 7204 differential unit, 4.75 m Adapter-to-9334/011 or 7204 differential unit, 8.0 m
4		9334/501 deskside differential unit
5	79X3795	External differential terminator, 50-pin, lo-density, 9334/011/501
6		9334/011 or 7204 differential device
7	95X2492	9334/011 or 7204 differential device-to-9334/011 or 7204 differential device cable, 2m.
8	95X2498	9334/501 deskside differential unit-to-9334/501 deskside differential unit cable, 2m.

High-Availability Configuration SCSI-2 Differential Cabling

Warning: The following high availability section describes supported hardware configurations. These configurations may not be supported by your software application. Be sure that your software application supports these configurations before attempting to use.

The high-availability configuration is implemented with the SCSI-2 Differential High Performance External I/O Controller (Type 4-2) by plugging the middle leg connector of the high-availability configuration Y cable into the controller's external 50-pin connector and by removing the two built-in differential terminator resistors from the controller. The two top legs of the high-availability configuration Y cable plug into the SCSI bus.

If the SCSI-2 Differential High Performance External I/O Controller (Type 4-2) is at the end of the SCSI bus, the shorter top leg of the high-availability configuration Y cable must be terminated with the differential high-density 50-pin terminator, part number 52G7350.

Notes: The high-availability configuration (Y cable with a terminator on the shorter top leg) permits the controller to be disconnected from the SCSI bus by removing the 50-pin external bus connection (middle leg of the Y cable). Although the SCSI bus continuity is maintained during removal of the controller, noise generated may create undetected bus errors if the bus is in use. To maintain data integrity, the SCSI bus should be quiesced during the removal of controllers, devices, terminators or cables.

High-availability software must be installed on both system units.

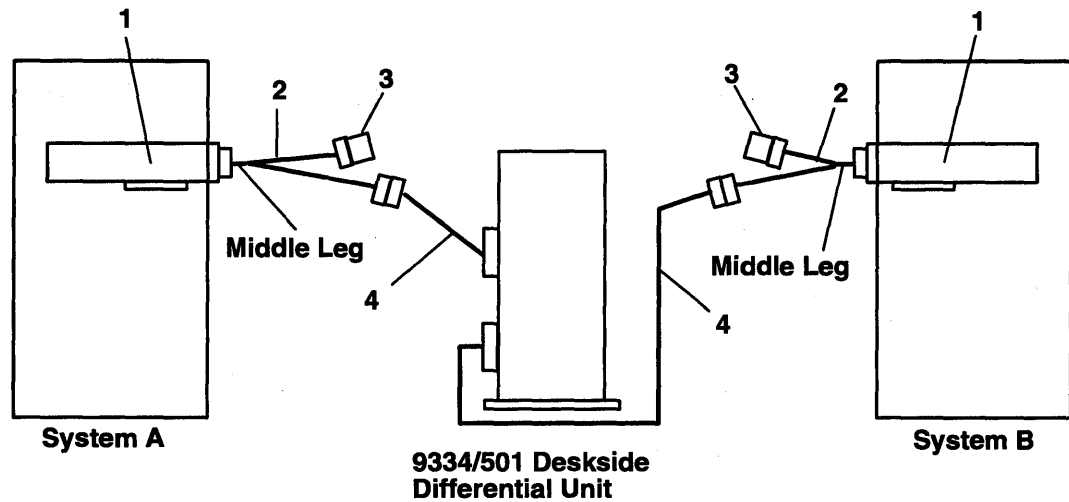
Cables for High Availability and Target Mode

F/C	Cable Description	Part Number	Cable Length (meters)
2422	Y cable	52G7348	.765
2423	System-to-system Cable (Target mode environment)	52G7349	2.5

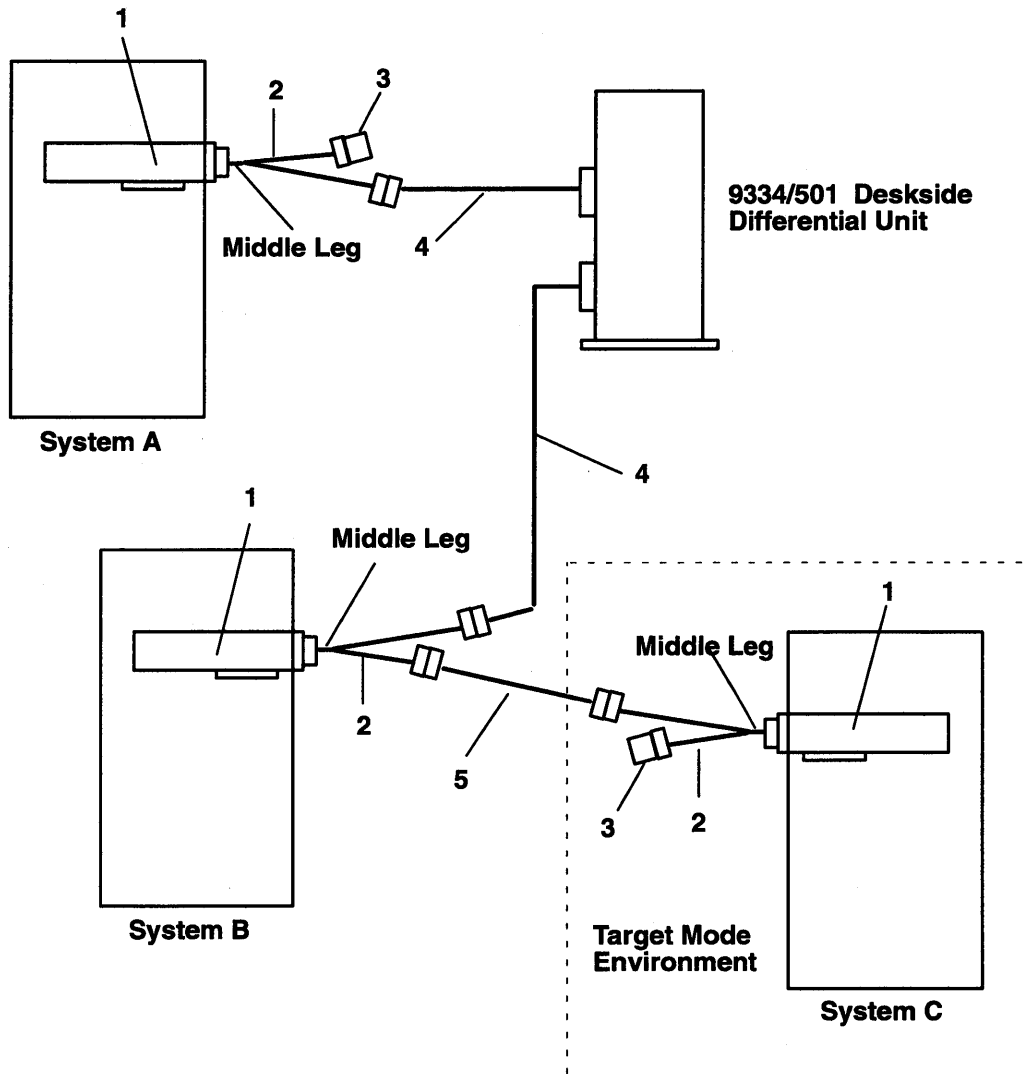
Terminator for High Availability and Target Mode

F/C	Cable Description	Part Number
*	50-pin hi-density (connects to Y cable)	52G7350
* Included in F/C 2222		

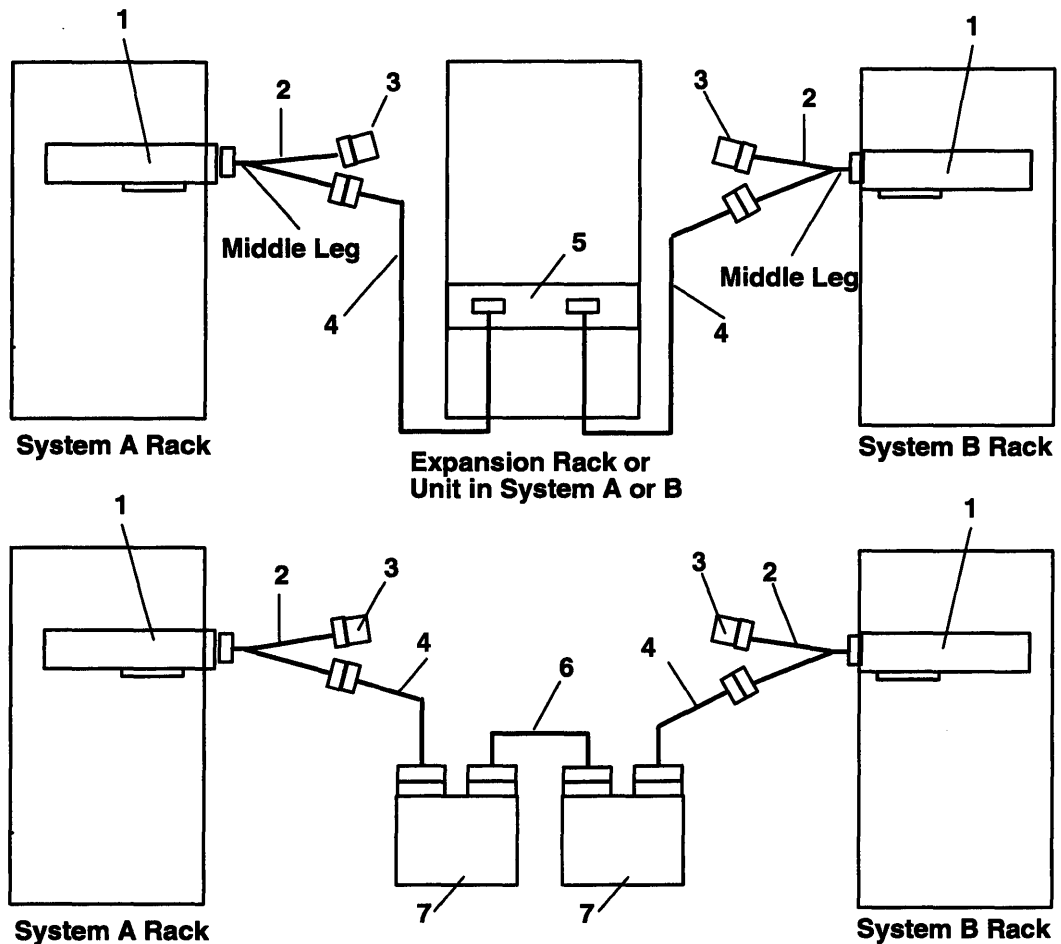
High Availability SCSI-2 Differential Cabling Configurations



Item Number	Part Number	Description
1	43G0176	SCSI-2 Differential High Performance External I/O Controller (Type 4-2—labelled “4-2” near the external connector)
2	52G7348	Y cable, differential, high-availability configuration, 0.765 m. (total, all legs)
3	52G7350	Differential terminator, high-availability configuration Y cable, 50-pin, high-density
4	67G0566	Cable, adapter-to-first 9334/501 deskside differential unit, 4.75 m
	67G0562	Cable, adapter-to-first 9334/501 deskside differential unit, 8.0 m



Item Number	Part Number	Description
1	43G0176	SCSI-2 Differential High Performance External I/O Controller (Type 4-2—labelled "4-2" near the external connector)
2	52G7348	Y cable, differential, high-availability configuration, 0.765 m. (total, all legs)
3	52G7350	Differential terminator, high-availability configuration, 50-pin, high-density (attaches to Y cable only)
4	67G0566 67G0562	Cable, adapter-to-first 9334/501 deskside differential unit, 4.75m Cable, adapter-to-first 9334/501 deskside differential unit, 8.0m
5	52G7349	Cable, system-to-system, SCSI-2 differential , 2.5 m



Item Number	Part Number	Description
1	43G0176	SCSI-2 Differential High Performance External I/O Controller (Type 4-2 labelled "4-2" near the external connector)
2	52G7348	Y cable, differential, high-availability configuration, .765 m. (total, all legs)
3	52G7350	Terminator, differential, high-availability configuration, 50-pin, high-density (attaches to Y cable only)
4	67G5093 95X2494	Cable, adapter-to- 9334/011 or 7204 differential device, 4.75m Cable, adapter-to-9334/011 or 7204 differential device, 8.0 m
5		9334/011 differential drawer
6	95X3795	9334/011 differential drawer-to-9334/011 differential drawer or 7204 differential unit to 7204 differential unit cable, 2 m.
7		7204 differential unit

Cables and Cable Assemblies

This section provides a summary of cable information, as well as pin-out information, for cables you may want to build yourself.

Note: When a second part number is listed, this indicates a cable is unique to the 7015 system unit or that two cable lengths are available. The longer length comes with the 7015 system unit but also can be used with the other system units.

Cable Identification Cross-Reference

*These cables have toroids and special shielding for electromagnetic compatibility (EMC).

**The Async Cable-EIA-232/V.24 is used to connect modems, printers, plotters, and ASCII terminals to the RISC System/6000 system unit. If the cable is used to connect a printer, plotter, or ASCII terminal to an EIA-232D port, a Printer/Terminal Interposer EIA-232 must be ordered in addition. If used to connect a modem to the RISC System/6000 system unit, the cable requires no interposer.

Cable Letter	Feature Code	Cable Name	Part Number	Length	
				m	ft
N	8132	128-Port Async Controller Cable	43G0936	0.23	0.75
NA	8131	128-Port Async Controller Cable	43G0937	4.57	15
P	8133	RJ45 to DB25 Converter Cable (four provided with each order)	43G0935	0.61	2
T	2705	4-Port Multiprotocol Interface Cable	40F9897	3	10
L	2996	16-Port Interface Cable-EIA-232	53F3311 53F3048	3	10
M	8132	16-Port Interface Cable-EIA-422A	53F3381	3	10
D	2936	Async Cable-EIA-232/V.24**	6323741	3	10
	6151	Battery Backup Extender Cable (feature code includes three extender cables)	02G7552	3	10
UU	N/A	7235 Signal Cable (comes with 7235)*	74F3102	2	6.5
CC	N/A	Display Adapter Cable (for 16-inch or 19-inch display) (comes with adapter)*	58F2903	2.4	8
MM	4223	Ethernet 10Base2 Transceiver	02G7435	1	3
MM	4224	Ethernet 10BaseT Transceiver	02G7429	1	3
SS	3120	External SCSI Controller Cable (for 7015 POWERservers, includes terminator)	00G1278	4.75	15.5
SS	2833	Integrated SCSI Controller Cable	32G0397	1.5	5
HH	4060	Lighted Programmable Function Keyboard or Dials Attachment Cable (for attaching to serial EIA-232D port)	39F8228	1.8	6
JJ	4061	Lighted Programmable Function Keyboard or Dials Attachment Cable (for attaching to display for power)	39F8302	1.8	6

Cable Letter	Feature Code	Cable Name	Part Number	Length m ft	
F	2811	Lighted Programmable Function Keyboard, Dials, or Tablet Attachment Cable (for attaching to IBM Graphics Input Device Adapter)*	6247480	2.1	6.9
J	2995	Multiprotocol Interface Cable	00F5524 53F3048	3 3	10 10
V	2706	Multiprotocol Attachment Cable-EIA-232/V.24	71F0165	3	10
U	2702	Multiprotocol Attachment Cable-V.35	71F0162	2	6.5
W	2704	Multiprotocol Attachment Cable-X.21	71F0164	3	10
ZZ	2915	Passthrough Terminator Cable	00G0959	1.5	5
A	3100	PC Parallel Printer Cable*	1525612 09F5544	2.1 5	6.9 16.4
	6005	Power Control Cable	00G1277 42F6839	10 3	33 10
WW	4217	POWER Gt1 Display Adapter Cable (contains an integral toroid assembly)	58F2902	2	6
E	2937	Printer/Terminal Interposer-EIA-232	59F2861	N/A	N/A
P	6402	RJ45 to DB25 Converter Cable (four provided with each order)	59F3432	0.45 7	1
SS	2832	SCSI Controller Cable	31F4221	1.5	5
VV	3130	SCSI Device-to-Device Cable	31F4222	0.66	2.2
QQ	N/A	Serial Link Cable	07G4859 07G4860	3 10	10 33
KK	2866	Serial Optical Channel Converter Cable	46F2440	6	20
KK	2867	Serial Optical Channel Converter Cable	46F2441	10	33
KK	2868	Serial Optical Channel Converter Cable	46F2442	20	65.5
KK	2869	Serial Optical Channel Converter Cable	46F2443	60	197
KK	2870	Serial Optical Channel Converter Cable	46F2444	100	328
		Serial Port Fanout Cable (to provide additional serial port for Xstation 130 and Xstation 150)	31F4590	0.17	0.57
B		Serial Port Jumper Cable (two provided with each system unit, except the Models M20, M2A, 220, 230, 250, 340, and 350, which do not require them)	00G0943	0.2	0.6
C		Serial Port Jumper Cable for 7015 (two provided with each system unit)	59F4533	3	10
MI	2757	System/370 Block Multiplexer Channel Adapter Cable	92F6697	1.8	6
NN	2758	System/370 Block Multiplexer Channel Cable Interface Assembly	N/A	N/A	N/A
K	2945	Terminal Cable-EIA-422A	30F8966	20	65.5

Cable Letter	Feature Code	Cable Name	Part Number	Length m ft	
Y	N/A	Token-Ring Cable (provided with adapter)	N/A	3 6	10 20
R	2966 2977	X.25 Attachment Cable-V.24	07F3161 53F3927	3 6	10 20
S	2967 2978	X.25 Attachment Cable-V.35	07F3171 53F3928	3 6	10 20
Q	2965 2976	X.25 Attachment Cable-X.21	07F3151 53F3926	3 6	10 20
A1	2836	SCSI-2 SE Controller to 1st Device Cable	32G0397	1.5	5
A4	9206	SCSI-2 SE Controller to 9334-500	45G2858	2.4	7.9
A3	9211	SCSI-2 SE Controller to 9334-010	51G8569	4.75	15.6
A3	3121	SCSI-2 SE Controller to 9348	51G8569	4.75	15.6
A5		SCSI-2 Internal 6 Device Cable (provided with Adapter FC 2831)	51G8571	1.8	6
A6	2914	SCSI-2 SE Passthrough Terminator Cable	51G8568	1.5	5
T1	7102	4/8-Port 232/422 Multiport/2 Cable	00F5524	3.1	10
T2	7104	6-Port Sync Multiport/2 Cable	15F8867	3.1	10
T3	7106	6-Port V.35 Portmaster Cable	72F0162	1.2	4
T4	7108	8-Port 232/422 Portmaster Cable	33F8962	1.2	4

*These cables have toroids and special shielding for electromagnetic compatibility (EMC).

**The Async Cable-EIA-232/V.24 is used to connect modems, printers, plotters, and ASCII terminals to the RISC System/6000 system unit. If the cable is used to connect a printer, plotter, or ASCII terminal to an EIA-232D port, a Printer/Terminal Interposer EIA-232 must be ordered in addition. If used to connect a modem to the RISC System/6000 system unit, the cable requires no interposer.

Multibyte Character Printer Cables					
N/A	4208, 5327, 5572, 5575, 5577, or 5587	81X7875	2.4	7.9	
N/A	4208, 5327, 5572, 5575, 5577, or 5587	09F5544	5	16.4	
N/A	4216 Model 510 Cable	56F7854	2.4	8	

Connector Descriptions

Cable Letter	Cable Name	Connector Descriptions (adapter end/device end)
T	4-Port Multiprotocol Interface Cable	78-pin D male/78-pin D female
L	16-Port Interface Cable-EIA-232	78-pin D male/25-pin D male
M	16-Port Interface Cable-EIA-422A	78-pin D male/25-pin D male
N	128-Port Async Controller Cable	15-pin HD male/15-pin HD female
P	RJ45 to DB25 Converter Cable	10-pin RJ45 male/25-pin D male
D	Async Cable-EIA-232/V.24	25-pin D female/25-pin D male
	Battery Backup Extender Cable (includes three extender cables)	Keyed appliance cord
NA	128-Port Async Controller Cable	15-pin HD male/15-pin HD female
UU	7235 Signal Cable (comes with 7235)*	68-pin D male/68-pin D male
CC	Display Adapter Cable (for 16-inch or 19-inch display) (comes with adapter)	Triple coaxial female D-shell/3 BNC male
MM	Ethernet 10Base2 Transceiver	10Base5/10Base2
MM	Ethernet 10BaseT Transceiver	10Base5/10BaseT
SS	External SCSI Controller Cable (for 7015 POWERservers)	60-pin male/50-pin male champ
SS	Integrated SCSI Controller Cable	50-pin SCSI-2/Dual 50-pin SCSI
JJ	Lighted Programmable Function Keyboard or Dials Attachment Cable (for attaching to display for power)	6-pin Berg female/6-pin DIN male
F	Lighted Programmable Function Keyboard, Dials, or Tablet Attachment Cable (for attaching to IBM Graphics Input Device Adapter)	8-pin MINI DIN male/8-pin MINI DIN male
HH	Lighted Programmable Function Keyboard or Dials Attachment Cable (for attaching to serial EIA-232D port)	25-pin D male/8-pin MINI DIN male
J	Multiprotocol Interface Cable	78-pin D male/78-pin D female
V	Multiprotocol Attachment Cable-EIA-232/V.24	25-pin D female/25-pin D male
U	Multiprotocol Attachment Cable-V.35	15-pin D female/34-pin D male
W	Multiprotocol Attachment Cable-X.21	15-pin D female/15-pin D female
ZZ	Passthrough Terminator Cable	60-pin male/Dual 50-pin SCSI
A	PC Parallel Printer Cable	25-pin D male/36-pin D male barrier
	Power Control Cable	4-pin female/4-pin female
WW	POWER Gt1 Display Adapter Cable (contains an integral toroid assembly)	15-pin MINI DIN female/5 BNC male
E	Printer/Terminal Interposer-EIA-232	25-pin D female/25-pin D male
SS	SCSI Controller Cable	60-pin male/50-pin male champ
VV	SCSI Device-to-Device Cable	50-pin male/Dual 50-pin SCSI
QQ	Serial Link Cable	6-pin female/6-pin female

Cable Letter	Cable Name	Connector Descriptions (adapter end/device end)
KK	Serial Optical Channel Converter Cable (all lengths)	SC Optical Receptacle Connector (color-coded)
	Serial Port Fanout Cable (to provide additional serial port for Xstation 130 and Xstation 150)	25-pin D female/25-pin D male (2)
B	Serial Port Jumper Cable (two provided with all system units except the Models M20, M2A, 220, 230, 250, 340, and 350)	10-pin MODU female/25-pin D male
B	Serial Port Jumper Cable for 7015 (two provided with all system units)	10-pin MODU female/25-pin D male
MI	System/370 Block Multiplexer Channel Adapter Cable	78-pin D male/78-pin D female and 78-pin D male ("Y" Cable)
NN	System/370 Block Multiplexer Channel Cable Interface Assembly	N/A
K	Terminal Cable-EIA-422A	25-pin D male/25-pin D male
Y	Token-Ring Cable (provided with adapter)	9-pin D male/cabling system plug
R	X.25 Attachment Cable-V.24	37-pin D female/25-pin D male
S	X.25 Attachment Cable-V.35	37-pin D female/34-pin D male
Q	X.25 Attachment Cable-X.21	37-pin D female/15-pin D male
A1	SCSI-2 SE Controller to 1st Device Cable	50-pin SCSI-2/Dual 50-pin SCSI
A4	SCSI-2 SE Controller to 9334-500 Cable	50-pin SCSI-2/50-pin SCSI
A3	SCSI-2 SE Controller to 9334-010 Cable	50-pin SCSI-2/50-pin SCSI
A3	SCSI-2 SE Controller to 9348 Cable	50-pin SCSI-2/50-pin SCSI
A6	SCSI-2 SE Passthrough Terminator Cable	50-pin SCSI-2/Dual 50-pin SCSI
T1	4/8-Port 232/422 Multiport/2 Cable	78-pin D male/25-pin D male
T2	6-Port Sync Multiport/2 Cable	78-pin D male/25-pin D male
T3	6-Port V.35 Portmaster Cable	100-pin D male/25-pin D male
T4	8-Port 232/422 Portmaster Cable	100-pin D male/25-pin D male
Multibyte Character Printer Cables		
	4208, 5327, 5572, 5575, 5577, or 5587 Cable	25-pin D male/36-pin D male barrier
	4208, 5327, 5572, 5575, 5577, or 5587 Cable	25-pin D male/36-pin D male barrier
	4216 Model 510 Cable	25-pin D male/36-pin D male barrier

Cable Connector Diagrams and Pin-Out Information

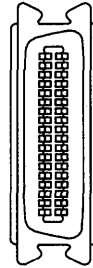
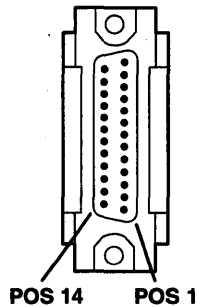
The following charts present pin-out information for cables you may want to build yourself. Only pins that are used are mentioned. Cables are presented alphabetically, according to the letter designations given in "Adapter Cabling" on page 1-153.

Custom cables must conform to the appropriate EIA standards. Standards information can usually be obtained from a cable vendor, but copies of specifications can be purchased by writing to the following address:

Electronic Industries Association
Attn. Standards Office
2001 Pennsylvania Ave., NW
Washington, DC 20006

Cable A

Description: PC Parallel Printer Cable.

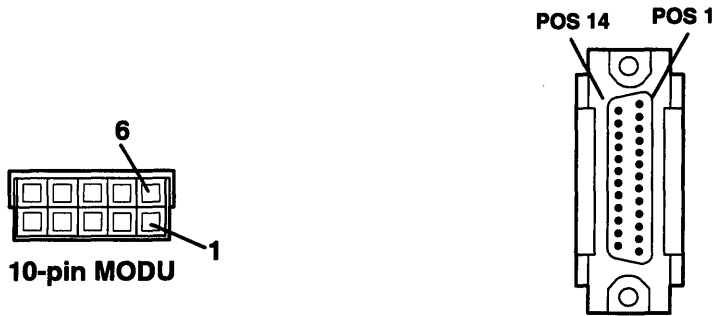


System End Connector	Signal	Device End Connector
Pin (Male)		Socket (Female)
1	Strobe	1
2	Data	2
3	Data	3
4	Data	4
5	Data	5
6	Data	6
7	Data	7
8	Data	8
9	Data	9
10	ACK	10
11	Busy	11
12	PE	12
13	Select	13

System End Connector	Signal	Device End Connector
Pin (Male)		Socket (Female)
14	Autofeed XT	14
18	Ground	15
19	Ground	16
Not Used		17
Not Used		18
21	Ground	19
21	Ground	20
21	Ground	21
22	Ground	22
22	Ground	23
23	Ground	24
23	Ground	25
24	Ground	26
24	Ground	27
24	Ground	28
25	Ground	29
25	Ground	30
16	INIT	31
15	Error	32
25	Ground	33
Not Used		34
Not Used		35
17	Select IN	36

Cables B and C

Description: Serial Port Jumper Cables.



System End Connector	Signal	Device End Connector
Socket (Female)		Pin (Male)
1	TxD	2
2	DTR	20
3	RTS	4
4	RI	22
	Not Used	
6	RxD	3
7	DSR	6
8	CTS	5
9	CD	8
10	Signal Ground	7
	Shield	1

Cable D

Description: Async Cable EIA-232/V.24.



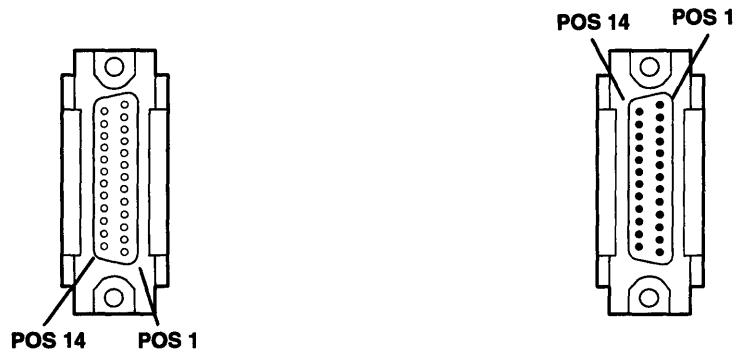
System End Connector	Signal	Device End Connector
Socket (Female)		Pin (Male)
Shell	Shield Ground	1, Shell
2	TxD	2
3	RxD	3
4	RTS	4
5	CTS	5
6	DSR	6
7	Signal Ground	7
8	CD	8
20	DTR	20
22	RI	22

For applications where the Multiprotocol Adapter/A will be used, the following additional pins are required.

System End Connector	Signal	Device End Connector
Socket (Female)		Pin (Male)
15	Tx CLK	15
17	Rx CLK	17

Cable E

Description: Printer/Terminal Interposer-EIA-232.



System End Connector	Signal	Device End Connector
Socket (Female)		Pin (Male)
1	Shield Ground	shell
2	TxD	3
3	RxD	2
4	RTS	5
5	CTS	4
6, 8	DSR, CD	20
7	Signal Ground	7
20	DTR	6, 8

Cable J

Description: part of the IBM Multiport Interface Cable.

The pin-out information for the connector on the back of the 8-port adapters is given in the "8-Port Async Adapters" section of the *IBM RISC System/6000 POWERstation and POWERserver Technical Reference Manual—Options and Devices*, SA23-2646.

Cable K

Description: Terminal Cable EIA-422A.



System End Connector	Signal	Device End Connector
Socket (Female)		Pin (Male)
shell	Shield Ground	1
2	TxA	15
3	RxA	19
4	TxB	17
5	RxB	25
7	Signal Ground	7

Cable L

Description: part of the IBM 16-Port Interface Cable-EIA-232.

The pin-out information for the connector on the back of the IBM 16-Port Async Adapter-EIA-232 is given in the "16-Port Async Adapters" section of the *IBM RISC System/6000 POWERstation and POWERserver Technical Reference Manual—Options and Devices*, SA23-2646.

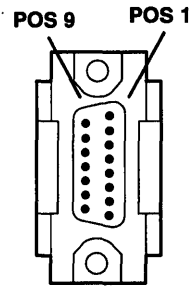
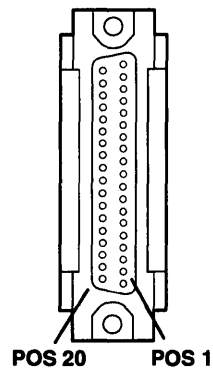
Cable M

Description: part of the IBM 16-Port Interface Cable-EIA-422A.

The pin-out information for the connector on the back of the IBM 16-Port Async Adapter-EIA-422A is given in the "16-Port Async Adapters" section of the *IBM RISC System/6000 POWERstation and POWERserver Technical Reference Manual—Options and Devices*, SA23-2646.

Cable Q

Description: X.25 Attachment Cable-X.21.



System End Connector	Signal	Device End Connector
Socket (Female)		Pin (Male)
10	T (A)	2
28	T (B)	9
11	C (A)	3
29	C (B)	10
12	R (A)	4
30	R (B)	11
13	I (A)	5
31	I (B)	12
14	S (A)	6
32	S (B)	13
7*	Ground	8
9*	Ground	8

*Tied together at system end connector.

Cable R

Description: X.25 Attachment Cable-V.24.

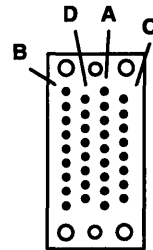
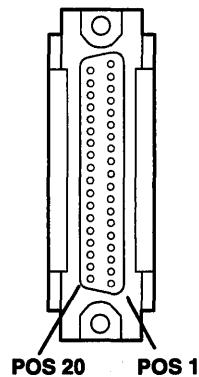


System End Connector	Signal	Device End Connector
Socket (Female)		Pin (Male)
2	TxD	2
3	RxD	3
4	RTS	4
5	CTS	5
6	DSR	6
8	CD	8
24	Tx CLK	15
26	Rx CLK	17
27	LLBT	18
20	DTR	20
21	RLBT	21
22	CI	22
25	TI	25
7*	Ground	7
9*	Ground	7
15*	Ground	7

*Tied together at system end connector.

Cable S

Description: X.25 Attachment Cable-V.35.



System End Connector	Signal	Device End Connector
Socket (Female)		Pin (Male)
4	RTS	C
5	CTS	D
6	DSR	E
8	CD	F
20	DTR	H
22	CI	J
35	TxD (A)	P
17	TxD (B)	S
37	RxD (A)	R
19	RxD (B)	T
36	Tx Clk (A)	Y
18	Tx Clk (B)	AA
34	Rx Clk (A)	V
16	Rx Clk (B)	X
7	Ground	B
15	Ground	B

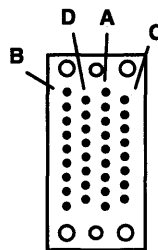
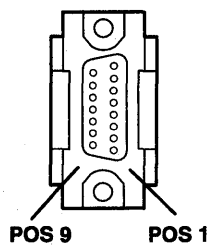
Cable T

Description: part of the IBM 4-Port Multiprotocol Communications Controller.

The pin-out information for the connector on the back of the IBM 4-Port Multiprotocol Communications Controller is given in the "4-Port Selectable Interface Board" section of the *IBM RISC System/6000 POWERstation and POWERserver Technical Reference Manual—Options and Devices*, SA23-2646.

Cable U

Description: 4-Port Multiprotocol Communications Controller V.35 Cable



System End Connector	Signal	Device End Connector
Socket (Female)		Pin (Male)
1	Ground Shield	A (Shield)
2	TxD (B)	S
3	RTS	C
4	RxD (B)	T
5	CTS	D
6	DSR	E
7	CD	F
8	Signal Ground	B
9	TxD (A)	P
10	Tx Clk (A)	Y
11	RxD (A)	R
12	Tx Clk (B)	AA
13	Rx Clk (B)	X
14	Rx Clk (A)	V
15	DTR	H

Cable V

Description: EIA-232D/V.24 cable for use with the IBM 4-Port Multiprotocol Communications Controller.



System End Connector	Signal	Device End Connector
Socket (Female)		Pin (Male)
2	TxD	2
3	RxD	3
4	RTS	4
5	CTS	5
6	DSR	6
7	Signal Ground	7
8	CD	8
15	Tx Clk	15
17	Rx Clk	17
20	DTR	20
22	RI	22
23	HRS	23
24	DTE Clk	24
1	Shield Ground	

Cable W

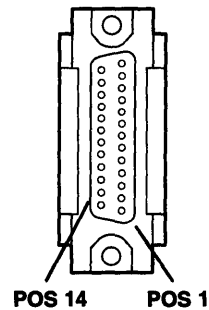
Description: X.21 cable for use with the 4-Port Multiprotocol Communications Controller.



System End Connector	Signal	Device End Connector
Socket (Female)		Socket (Female)
	Shield	
2	T(A)	2
3	C(A)	3
4	R(A)	4
5	I(A)	5
6	S(A)	6
8	Signal Ground	8
9	T(B)	9
10	C(B)	10
11	R(B)	11
12	I(B)	12
13	S(B)	13

Cable X

Description: EIA-422A cable for use with the 4-Port Multiprotocol Communications Controller (Port 0 only).



System End Connector	Signal	Device End Connector
Socket (Female)		Customer supplied
	Ground Shield	
2	TxA	-
3	RxA	-
4	TxB	-
5	RxB	-
7	Signal Ground	-
17	RxB Clk	-
22	RxA Clk	-
23	TxA Clk	-
24	TxB Clk	-

Cable KK

Description: Optical Channel Converter Cable.

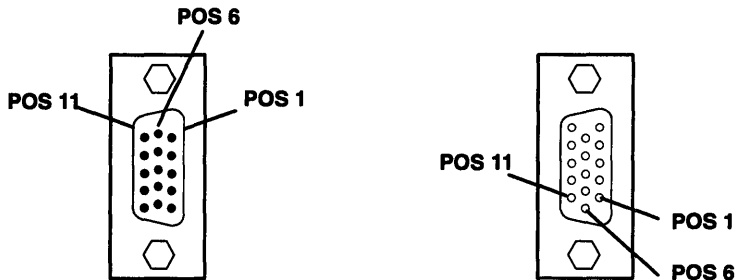
If customer-supplied, the cable must be built based on the following:

- Operating wavelength: 780 nm
- Fiber type and length:
 - 50/125 um (minimum length, 4 m (13 ft)), maximum length is determined by user-available link loss.
 - 62.5/125 um (minimum length, 4 m (13 ft)), maximum length is determined by user-available link loss, and cannot exceed 500 m (1640 ft), regardless of link loss.
- User-available link loss: 10.5 dB
- Averaged launched power: Minimum –4.7 dBm, Typical –3 dBm, Maximum –0.9 dBm
- Receiver sensitivity: Minimum –16.0 dBm, Maximum –0.9 dBm
- SC connector attenuation: Typical 0.25 dB, Maximum 0.5 dB
- Total fiber bandwidth must exceed 300 MHz.

Cable NB, NC

Description: 128-Port Async Controller Cable, 8-wire.

The cable has eight conductors, four twisted-pair, and is shielded on the outside. If built to a length of 300 m (1000 ft) or less, conductors should be 28 AWG (stranded wire) with a capacitance rating of 52 pF/m (16 pF/ft) or less (Belden type 9806 or equivalent). For lengths greater than 300 m (1000 ft), conductors should be 24 AWG (stranded wire) with a capacitance rating of 52 pF/m (16 pF/ft) or less (Belden type 9831 or equivalent).



System End Connector		Device End Connector	
Pin (Male)	Signal	Signal	Socket (Female)
1	RxD –	TxD –	1
2	RxD +	TxD +	2
4	RxC –	TxC –	4
5	RxC +	TxC +	5
6	TxD –	RxD –	6
7	TxD +	RxD +	7
9	TxC –	RxC –	9
10	TxC +	RxC +	10
Shell	Shield Ground	Shield Ground	Shell

The 128-port async controller supports multiple controller line baud rates in 8-wire direct-attach mode. The following table shows the maximum allowable controller line length for each supported baud rate. The controller line length is the actual cable length from the controller to the last remote async node. in the controller line.

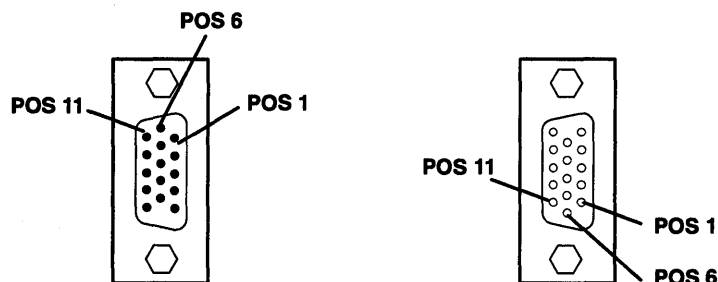
Controller Line Baud Rate	Total Controller Cable Length	
bps	m	ft
2400	1200	3930
4800	1200	3930
9600	1200	3930
19200	1200	3930
38400	1200	3930
57600	1200	3930
76800	1200	3930
115000	900	2950
230000	400	1350
460000	300	1000
920000	300	1000
1200000	300	1000

Note: The above table assumes no intermediate connectors between remote async nodes. Each additional connection decreases the maximum allowable controller line length by approximately two percent due to increased line capacitance.

Cable ND

Description: 128-Port Async Controller Cable, 4-wire.

The cable has four conductors, two twisted-pair, and is shielded on the outside. If built to a length of 300 m (1000 ft) or less, conductors should be 28 AWG (stranded wire) with a capacitance rating of 52 pF/m (16 pF/ft) or less (Belden type 9804 or equivalent). For lengths greater than 300 m (1000 ft), conductors should be 24 AWG (stranded wire) with a capacitance rating of 52 pF/m (16 pF/ft) or less (Belden type 9829 or equivalent).



System End Connector		Device End Connector	
Pin (Male)	Signal	Signal	Socket (Female)
1	RxD -	TxD -	1
2	RxD +	TxD +	2
6	TxD -	RxD -	6
7	TxD +	RxD +	7
Shell	Shield Ground	Shield Ground	Shell

The 128-port Async Controller supports two controller line baud rates in 4-wire direct attach mode. The following table shows the maximum allowable controller line length for each supported baud rate. The controller line length is the actual cable length from the controller to the last remote async node in the controller line.

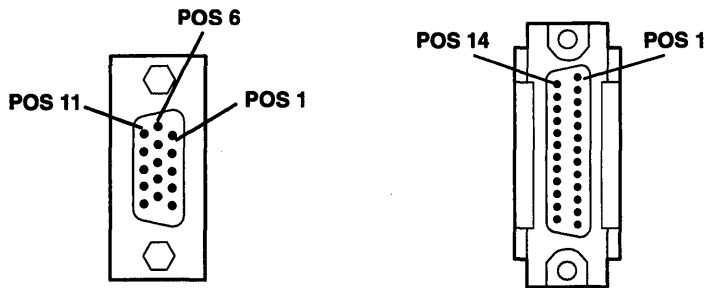
Controller Line Baud Rate	Total Controller Cable Length	
bps	m	ft
230000	400	1350
460000	300	1000

Note: The above table assumes no intermediate connectors between remote async nodes. Each additional connection will decrease the maximum allowable controller line length by approximately two percent due to increased line capacitance.

Cable NE

Description: 128-Port Async Controller EIA-232 Modem Cable, System.

The cable has five conductors and is shielded on the outside. Cable length can be up to 30 m (100 ft). Conductors should be 24 AWG (stranded wire) with a capacitance rating of 41 pF/m (12.5 pF/ft) or less (Belden type 9929 or equivalent).



System End Connector		Modem End Connector	
Pin (Male)	Signal	Signal	Pin (Male)
1	RxD	RxD	3
4	RxC	RxC	17
6	TxD	TxD	2
9	TxC	TxC	15
12	Signal Ground	Signal Ground	7
Shell	Shield Ground	Shield Ground	1
		RTS, CTS	4, 5
		DSR, DTR	6, 20

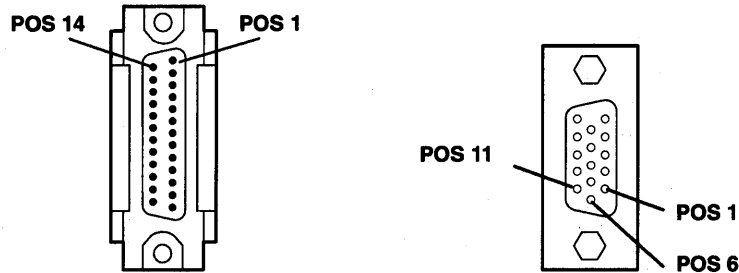
Note: When this cable is used with the IBM 5822 DSU/CSU, modem-end pins 4, 6, and 20 are connected, and pin 5 is left unconnected.

The 128-port async controller supports multiple controller line baud rates in EIA-232 synchronous modem attach mode. However, to ensure data integrity, controller line baud rates of 57.6 Kbps or less are recommended.

Cable NF

Description: 128-Port Async Controller EIA-232 Modem Cable, Device.

The cable has five conductors and is shielded on the outside. Cable length can be up to 30 m (100 ft). Conductors should be 24 AWG (stranded wire) with a capacitance rating of 41 pF/m (12.5 pF/ft) or less (Belden type 9929 or equivalent).



Modem End Connector		Device End Connector	
Pin (Male)	Signal	Signal	Socket (Female)
3	RxD	RxD	6
17	RxC	RxC	9
2	TxD	TxD	1
15	TxC	TxC	4
7	Signal Ground	Signal Ground	12
4,5	RTS,CTS		
6,20	DSR, DTR		
1	Shield Ground	Shield Ground	Shell

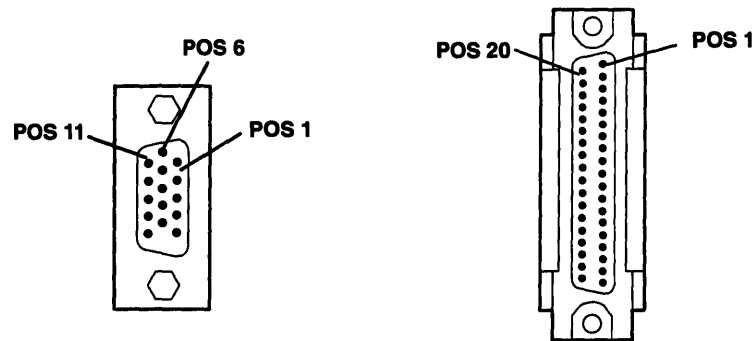
Note: When this cable is used with the IBM 5822 DSU/CSU, modem-end pins 4, 6, and 20 are connected, and pin 5 is left unconnected.

The 128-port async controller supports multiple controller line baud rates in EIA-232 synchronous modem attach mode. However, to ensure data integrity, controller line baud rates of 57.6 Kbps or less are recommended.

Cable NG

Description: 128-Port Async Controller EIA-422 Modem Cable, System.

The cable has eight conductors, four twisted-pair, and is shielded on the outside. If built to a length of 300 m (1000 ft) or less, conductors should be 28 AWG (stranded wire) with a capacitance rating of 52 pF/m (16 pF/ft) or less (Belden type 9806 or equivalent). For lengths greater than 300 m (1000 ft), conductors should be 24 AWG (stranded wire) with a capacitance rating of 52 pF/m (16 pF/ft) or less (Belden type 9831 or equivalent).



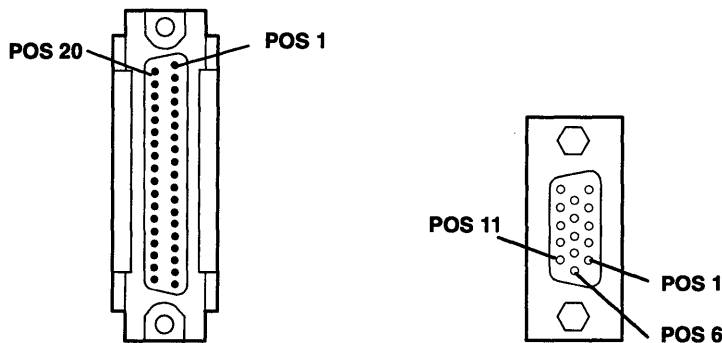
System End Connector		Modem End Connector	
Pin (Male)	Signal	Signal	Pin (Male)
1	RxD –	RD –	6
2	RxD +	RD +	24
4	RxC –	RT –	8
5	RxC +	RT +	26
6	TxD –	SD –	4
7	TxD +	SD +	22
9	TxC –	ST –	5
10	TxC +	ST +	23
12	Shield Ground	Shield Ground	19

The 128-port async controller supports multiple controller line baud rates in EIA-422 synchronous modem attach mode. See the Controller Line Baud Rate table for Cable NB on page 1-233.

Cable NH

Description: 128-Port Async Controller EIA-422 Modem Cable, Device.

The cable has eight conductors, four twisted-pair, and is shielded on the outside. If built to a length of 300 m (1000 ft) or less, conductors should be 28 AWG (stranded wire) with a capacitance rating of 52 pF/m (16 pF/ft) or less (Belden type 9806 or equivalent). For lengths greater than 300 m (1000 ft), conductors should be 24 AWG (stranded wire) with a capacitance rating of 52 pF/m (16 pF/ft) or less (Belden type 9831 or equivalent).

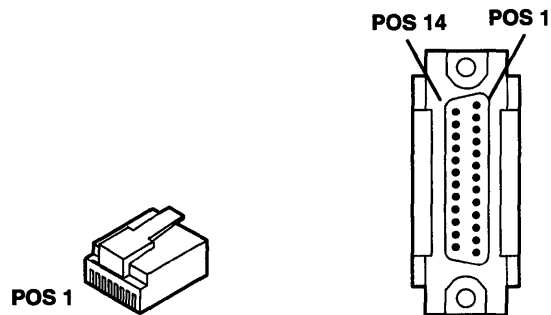


Modem End Connector		Device End Connector	
Pin (Male)	Signal	Signal	Socket (Female)
6	RD -	RxD -	6
24	RD +	RxD +	7
8	RT -	RxC -	9
26	RT +	RxC +	10
4	SD -	TxD -	1
22	SD +	TxD +	2
5	ST -	TxC -	4
23	ST +	TxC +	5
19	Shield Ground	Shield Ground	12

The 128-port async controller supports multiple controller line baud rates in EIA-422 synchronous modem attach mode. See the Controller Line Baud Rate table for Cable NB on page 1-233.

Cable NK

Description: RJ45 to DB25 Converter Cable for use with the IBM Remote Async Node 16-Port EIA-232.



System End Connector		Device End Connector	
Pin (Male)	Signal	Signal	Pin (Male)
1	RI	RI	22
2	DSR	DSR	6
3	RTS	RTS	4
4	Chassis Ground	Chassis Ground	Shell
5	TxD	TxD	2
6	RxD	RxD	3
7	Signal Ground	Signal Ground	7
8	CTS	CTS	5
9	DTR	DTR	20
10	CD	CD	8

Notes:

1. This cable assembly is shielded.
2. This cable assembly and the 64-port RJ45 to DB25 converter cable (FC 6402) are not interchangeable.

Cable NL

Description: customer-supplied cable for connecting Remote Async Node 16-Port EIA-232 to a printer or terminal device.

Cable length can be up to 61 m (200 ft). Use overall foil/braid shielded multiconductor cable with a capacitance rating of 41 pF/m (12.5 pF/ft) or less. Conductors should be 28 AWG (stranded wire). For lengths less than 61 m (200 ft), higher capacitance cable can be used, as long as the total capacitance (including intermediate connectors and cables) does not exceed 2500 pF.



System End Connector					Device End Connector	
Pin (Male)				Signal	Pin (Male)	Signal
4-Pin RJ11	6-Pin RJ11	8-Pin J45	10-Pin RJ45			
			1	RI	22	RI
		1	2	DSR*	20	DTR
	1	2	3	RTS	5	CTS
1	2	3	4	Chassis Ground	Shell, 1	Chassis Ground
2	3	4	5	TxD	3	RxD
3	4	5	6	RxD	2	TxD
4	5	6	7	Signal Ground	7	Signal Ground
	6	7	8	CTS	4	RTS
		8	9	DTR	6	DSR
			10	CD *	8	CD *

*The physical location of CD and DSR may be interchanged through software control if desired.

Note: When using a 10-pin RJ45 connector, pin 2 is connected to pin 10.

Warning: The receivers and drivers used in most asynchronous communications devices are sensitive to electrostatic discharge (ESD). To reduce the possibility of exposure to ESD, observe the following cabling practices when building or using device cables for attachment to the Remote Async Node16-Port EIA-232.

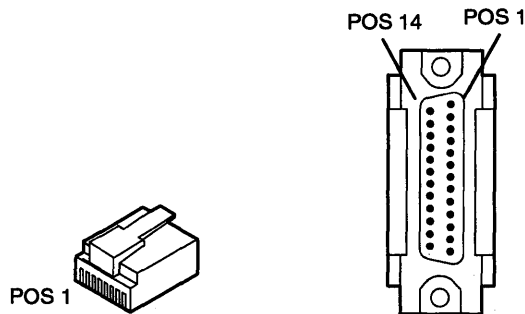
Notes:

1. Do not build a cable that has exposed conductors, leads, or pins that could be touched by someone not protected against ESD. Avoid the use of punchdown blocks and patch panels which have exposed terminator/pins. In the event that you use intermediate connectors or cables, be sure to discharge them to ground before plugging them into equipment.
2. Do not run any cables outdoors without having proper transient voltage suppression devices installed.
3. Do not route cables near or around items such as power transformers, high-power switching devices and refrigeration units.
4. Use shielded cables. All wires should be terminated, not floating. The shield should be connected to shield ground at the remote async node.

Cable NM

Description: customer-supplied cable for connecting Remote Async Node 16-Port EIA-232 to a modem device.

Cable length can be up to 61 m (200 ft). Use overall foil/braid shielded multiconductor cable with a capacitance rating of 41 pF/m (12.5 pF/ft) or less. Conductors should be 28 AWG (stranded wire). For lengths less than 61 m (200 ft), higher capacitance cable can be used, as long as the total capacitance (including intermediate connectors and cables) does not exceed 2500 pF.



System End Connector				Signal	Device End Connector
Pin (Male)					Pin (Male)
4-Pin RJ11	6-Pin RJ11	8-Pin RJ45	10-Pin RJ45		
			1	RI	22
		1	2	DSR*	6
	1	2	3	RTS	4
1	2	3	4	Chassis Ground	Shell, 1
2	3	4	5	TxD	2
3	4	5	6	RxD	3
4	5	6	7	Signal Ground	7
	6	7	8	CTS	5
		8	9	DTR	20
			10	CD *	8

*The physical location of CD and DSR may be interchanged through software control if desired.

Warning: The receivers and drivers used in most asynchronous communications devices are sensitive to electrostatic discharge (ESD). To reduce the possibility of exposure to ESD, observe the following:

1. Do not build a cable that has exposed conductors, leads, or pins that could be touched by someone not protected against ESD. Avoid the use of punchdown blocks and patch panels which have exposed terminators/pins. In the event that you use intermediate connectors or cables, discharge them to ground before plugging them into equipment.
2. Do not run any cables outdoors without having proper transient voltage suppression devices installed.
3. Do not route cables near or around items such as power transformers, high-power switching devices and refrigeration units.
4. Use shielded cables. All wires should be terminated, not floating. The shields should be connected to shield ground at the concentrator.

Multiport/2 4P/8P Interface Cable

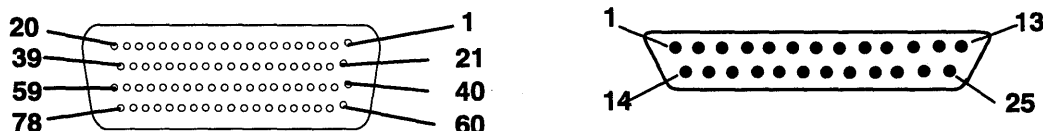
The 4P/8P Multiport Interface Cable supports all of the following Multiport/2 EIBs:

- 8P EIA-422
- 8P EIA-232
- 4P EIA-232
- 4P EIA-232/4P EIA-422.

Cable T1

Description: 4/8-Port 232/422 Multiport/2 Cable. The system end of the 4/8-Port 232/422 Multiport/2 Cable consists of a 78-position D-shell connector. The cable device end consists of a Molded Distribution Box (MDB) with eight 25-pin D-shell connectors to allow up to eight standard device connections, depending on the number of ports supported by the Multiport/2 adapter.

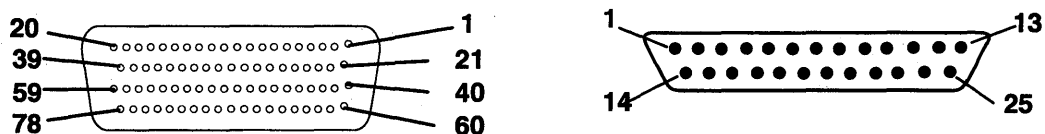
EIA-422 Multiport/2 Adapter 78- and 25-position connector



Mnemonic	Port 0	Port 1	Port 2	Port 3	25-Position Connector
TxD	40	04	66	69	02/BA-103
RxD	02	64	28	31	03/BB-104
RTS	01	63	27	30	04/CA-105
CTS	61	25	48	51	05/CB-106
DTECLK	41	05	—	—	24/DA-113
SG	43	07	08	67	07/AB-102
DCD	22	45	09	12	08/CF-109
RxCLKIN	62	26	—	—	17/DD-115
DTR	60	24	47	50	20/CD-108.2
DSR	42	06	68	71	06/CC-107
HRS	21	44	—	—	23/CH-111
RI	03	65	29	32	22/CE-125
TxCLKIN	23	46	—	—	15/DB-114

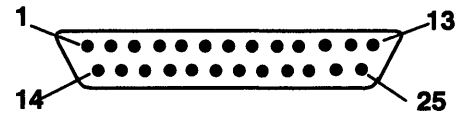
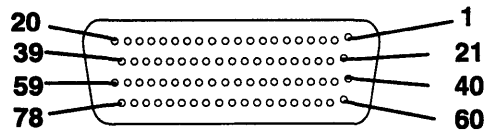
Mnemonic	Port 4	Port 5	Port 6	Port 7	25-Position Connector
TxD+	73	55	76	58	02/TXA
TxD-	34	16	37	19	04/TXB
RxD+	54	75	57	78	03/RXA
RxD-	15	36	18	39	05/RXB
SG	11	70	—	—	07/

8-Port EIA-232-C Multiport/2 Adapter 78- and 25-Position Connectors



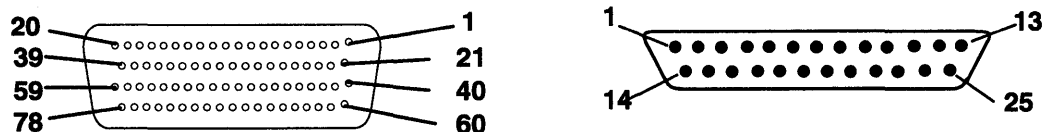
Mnemonic	Port 0	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	25-Position Connector
TxD	40	04	66	69	73	55	76	58	02/BA-103
RxD	02	64	28	31	54	75	57	78	03/BB-104
RTS	01	63	27	30	34	16	37	19	04/CA-105
CTS	61	25	48	51	15	36	18	39	05/CB-106
DTECLK	41	05	—	—	—	—	—	—	24/DA-113
SG	43	07	08	67	11	70	—	—	07/AB-102
DCD	22	45	09	12	74	56	77	59	08/CF-109
RxCLKIN	62	26	—	—	—	—	—	—	17/DD-115
DTR	60	24	47	50	35	17	38	20	20/CD-108.2
DSR	42	06	68	71	72	33	53	14	06/CC-107
HRS	21	44	—	—	—	—	—	—	23/CH-111
RI	03	65	29	32	49	52	10	13	22/CE-125
TxCLKIN	23	46	—	—	—	—	—	—	15/DB-114

4-Port EIA-232-C Multiport/2 Adapter 78- and 25-Position Connectors



Mnemonic	Port 0	Port 1	Port 2	Port 3	25-Position Connector
TxD	40	04	66	69	02/BA-103
RxD	02	64	28	31	03/BB-104
RTS	01	63	27	30	04/CA-105
CTS	61	25	48	51	05/CB-106
DTECLK	41	05	—	—	24/DA-113
SG	43	07	08	67	07/AB-102
DCD	22	45	09	12	08/CF-109
RxCLKIN	62	26	—	—	17/DD-115
DTR	60	24	47	50	20/CD-108.2
DSR	42	06	68	71	06/CC-107
HRS	21	44	—	—	23/CH-111
RI	03	65	29	32	22/CE-125
TxCLKIN	23	46	—	—	15/DB-114

4-Port EIA-232-C/4-Port-422-A Multiport/2 Adapter



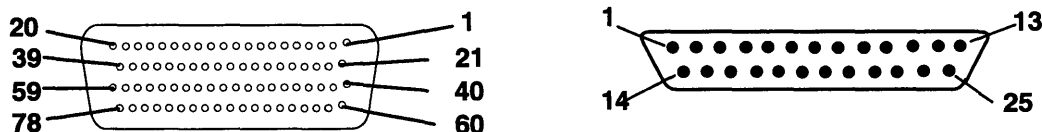
Mnemonic	Port 0	Port 1	Port 2	Port 3	25-Position Connector
TxD	40	04	66	69	02/BA-103
RxD	02	64	28	31	03/BB-104
RTS	01	63	27	30	04/CA-105
CTS	61	25	48	51	05/CB-106
DTECLK	41	05	—	—	24/DA-113
SG	43	07	08	67	07/AB-102
DCD	22	45	09	12	08/CF-109
RxCLKIN	62	26	—	—	17/DD-115
DTR	60	24	47	50	20/CD-108.2
DSR	42	06	68	71	06/CC-107
HRS	21	44	—	—	23/CH-111
RI	03	65	29	32	22/CE-125
TxCLKIN	23	46	—	—	15/DB-114

Mnemonic	Port 4	Port 5	Port 6	Port 7	25-Position Connector
TxD+	73	55	76	58	02/TxA
TxD-	34	16	37	19	04/TxB
RxD+	54	75	57	78	03/RxA
RxD-	15	36	18	39	05/RxB
Signal Ground	11	70	—	—	07/GRD

Cable T2

Description: 6-Port Sync Multiport/2 Cable. The system end of the 6-Port Sync Multiport/2 cable consists of a 78-position D-shell connector. The cable device end consists of an MDB with six 25-pin D-shell connectors to allow six devices connection to the six ports supported by this adapter.

6-Port Synchronous EIA-232-C Multiport/2 Adapter 78- and 25-Position Connectors

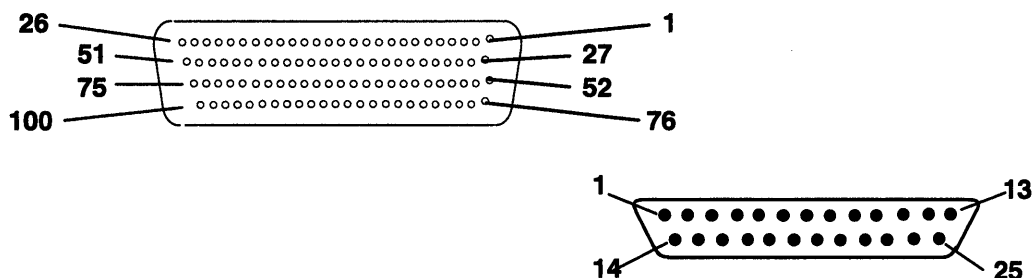


Mnemonic	Port 0	Port 1	Port 2	Port 3	Port 4	Port 5	25-Position Connector
TxD	40	04	66	69	73	55	02/BA-103
RxD	02	64	28	31	54	75	03/BB-104
RTS	01	63	27	30	34	16	04/CA-105
CTS	61	25	48	51	15	36	05/CB-106
DTECLK	41	05	19	20	10	13	24/DA-113
SG	43	07	08	67	11	70	07/AB-102
DCD	22	45	09	12	74	56	08/CF-109
RxCLKIN	62	26	57	77	18	53	17/DD-115
DTR	60	24	47	50	35	17	20/CD-108.2
DSR	42	06	68	71	72	33	06/CC-107
HRS	21	44	76	37	38	58	23/CH-111
RI	03	65	29	32	49	52	22/CE-125
TxCLKIN	23	46	78	59	39	14	15/DB-114

Cable T3

Description: 6-Port V.35 Portmaster Cable. The system end of the 6-Port V.35 Portmaster cable consists of a 100-position D-shell connector. The cable device end consists of an MDB with six 25-pin D-shell connectors to allow six devices connection to the six ports supported by the adapter.

6-Port V.35 Portmaster Adapter/A 100- and 25-Position Connectors

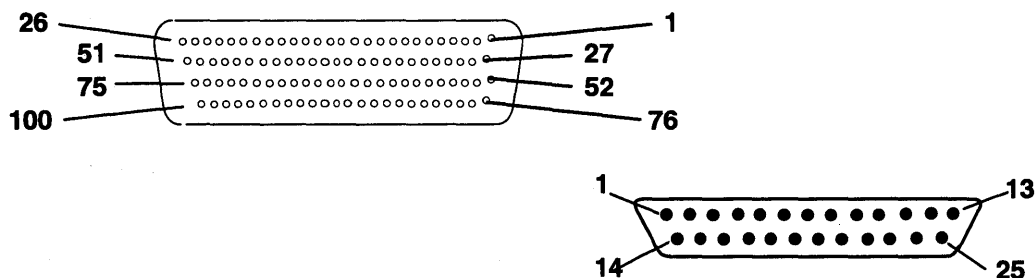


Mnemonic	I/O	Port 0	Port 1	Port 2	Port 3	Port 4	Port 5	25-Position Connector
TxDA	O	94	21	47	71	72	23	02
TxDB	O	70	46	22	95	96	48	14
RxDA	I	08	54	58	29	28	57	03
RxDB	I	33	78	82	04	03	81	16
TxCA IN	I	76	06	77	56	27	55	15
TxCB IN	I	52	31	53	80	02	79	12
RxCA	I	20	41	38	19	32	30	17
RxCB	I	45	16	13	44	07	05	09
TxCA OUT	O	24	73	98	25	99	26	24
TxCB OUT	O	49	97	74	50	75	51	11
RTS	O	42	43	92	93	37	39	04
CTS	I	15	65	86	87	59	09	05
DCD	I	89	40	62	61	35	84	08
DTR	O	18	91	69	68	14	12	20
DSR	I	66	90	88	64	60	85	06
SGND	—	34	17	63	67	01	83	07
FGND	—	100	Shield					01

Cable T4

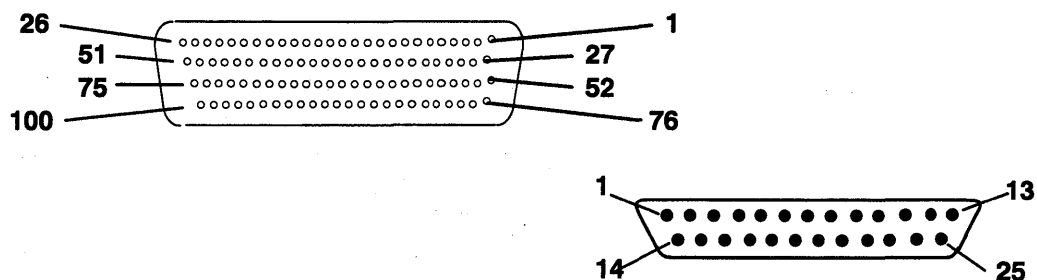
Description: 8-Port 232/422 Portmaster Cable. The system end of the 8-Port 232/422 Portmaster cable consists of a 100-position D-shell connector. The cable device end consists of an MDB with eight 25-pin D-shell connectors to allow up to eight devices connection to the eight ports supported by the adapter.

8-Port EIA-422-A Portmaster Adapter/A 100- and 25-Position Connectors



Mnemonic	I/O	Port 0	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	25-Position Connector
TxD	O	51	54	07	10	13	16	94	48	02/SDA
	O	52	55	08	11	14	17	95	49	02/SDB
RxD	I	02	05	83	86	89	92	46	74	03/RDA
	I	78	81	35	38	41	44	72	25	17/RDB
-RTS	O	01	04	82	85	88	91	45	73	04/RSA
	O	76	79	33	36	39	42	70	23	20/RSB
-CTS	I	77	80	34	37	40	43	71	24	05/CSA
	I	53	56	09	12	15	18	96	50	06/CSB
TxCLK	I	28	31	59	62	65	68	21	99	08/STA
	I	03	06	84	87	90	93	47	75	22/STB
RxCLK	I	29	32	60	63	66	69	22	100	15/RTA
	I	27	30	58	61	64	67	20	98	23/RTB
SGND	—	19	19	26	26	57	570	97	97	07/GND
FGND	Cable Shield									01/FGND

8-Port EIA-232-D Portmaster Adapter/A 100- and 25-Position Connectors



Mnemonic	I/O	Port 0	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	25-Position Connector
TxD	O	51	54	07	10	13	16	94	48	02/BA
RxD	I	02	05	83	86	89	92	46	74	03/BB
RTS	O	01	04	82	85	88	91	45	73	04/CA
CTS	I	77	80	34	37	40	43	71	24	05/CB
DCD	I	28	31	59	62	65	68	21	99	08/CF
DTR	O	76	79	33	36	39	42	70	23	20/CD
DSR	I	53	56	09	12	15	18	96	50	06/CC
HRS	I	27	30	58	61	64	67	20	98	23/CI
RI	I	03	06	84	87	90	93	47	75	22/CE
TxCLKIN	I	29	32	60	63	66	69	22	100	15/DB
TxCLK	O	52	55	08	11	14	17	95	49	24/DA
RxCLK	I	78	81	35	38	41	44	72	25	17/DD
SGND	—	19	19	26	26	57	57	97	97	07/AB
FGND	Cable Shield									01/AA

Power Cords, Plugs, and Electrical Needs

General Considerations

In planning for your electrical needs, consider the following:

- You must have adequate power to meet the requirements of the devices.
- The power cords supplied with the devices need to be long enough to reach the available electrical power receptacles.
- Electrical outlets must be compatible with the electrical plugs supplied with the devices.
- Electrical outlets must be functional and properly grounded.
- A safe path for power cords.
- Depending on the computing environment, you may need surge protection devices.
- Radio and radar transmitters close to your location.
- Ensure the functionality of the uninterruptible power source (UPS), if used.

Power Cords

IBM supplies power cords with attached plugs. For the Model 220, the cord is 1.8 m (6 ft.) long. For all other desktop and deskside system units the cord is 2.8 m (9 ft.) in length, except in Chicago, where it is 1.8 m (6 ft.). For the 7015 POWERservers, the cord is 4.3 m (14 ft.) long, except in Chicago, where it is 1.8 m (6 ft.).

You, the customer, must supply the corresponding power outlet receptacles. For non-U.S. countries IBM supplies power cords with an attached plug that corresponds to the power-outlet receptacle most commonly used in that country.

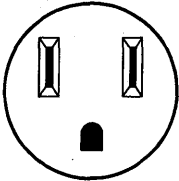
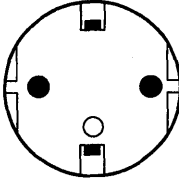
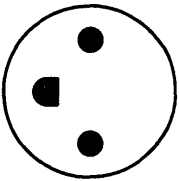
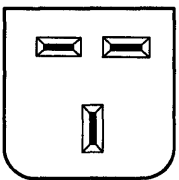
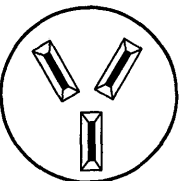

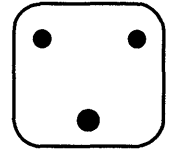
Plugs


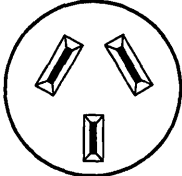
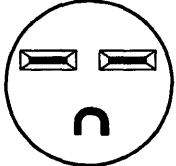
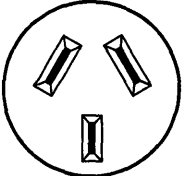
The following table presents information concerning system unit plugs for various countries. The plugs are listed in order of feature code. Consult your RISC System/6000 marketing representative for information on which type of plug is used in your area or country.

Notes:

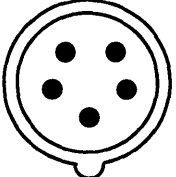
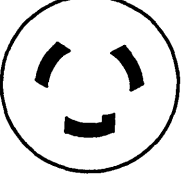
1. Feature codes 9113 and 9114 are for a rack power distribution unit rather than a power cord. These codes indicate that the power distribution unit includes a power cord; therefore, you do not need to order one separately. Unless otherwise noted, the system units have a 9111 power distribution unit, which does not include a power cord.
2. In the United States, raised floor installations involving racks may require a Russell and Stoll (R & S) watertight plug/connector/receptacle (feature code 9801 or 9987).

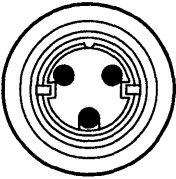
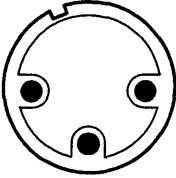
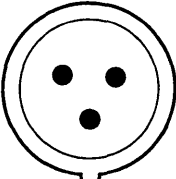
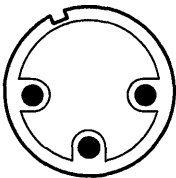
Desktop and Deskside System Unit Power Plugs

Feature Code	Plug	Standard Compliance or Type
9116 9800 9986		NEMA WD-1 5-15P 125 V, 15 A
9820		CEE7 VII 250 V, 16 A
9821		Afsnit 107 250 V, 10 A
9825		BS 1363 250 V, 13 A
9827		SII-32-1971 250 V, 16 A
9828		SEV 1011.1959 250 V, 10 A
9829		SABS 164, BS 546 250 V, 16 A

Feature Code	Plug	Standard Compliance or Type
9830		CEI 23-16/VII 250 V, 10 A
9831		AS 3122-1981 250 V, 10 A
9833		NEMA WD-1 6-15P 250 V, 15 A
9834		IEC 83-A5 1957 250 V, 10 A

Rack-Type System Unit Power Plugs

Feature Code	Plug	Standard Compliance or Type
9113 9114		IEC 309 380-415 V, 32 A
9800 9824 9986		NEMA WD-5 L6-30P 250 V, 30 A

Feature Code	Plug	Standard Compliance or Type
9801 9987		R & S 3750 250 V, 30 A
9822		Wilco Weatherproof WIP130 250 V, 30 A
9823		IEC 309 220 to 240 V, 32 A
9826		PDL Insulated 56PA330 250 V, 30 A

Electrical Considerations

Most of these electrical considerations apply to all system units, except for the “Power Phase Imbalance” and “Power Phase Rotation” sections, which apply only to the RISC System/6000 racks.

Primary Computer Power Service

While a dedicated power supply is not necessary, for maximum reliability the computer power panel should connect to feeders that do not serve other loads. Connect electrical noise-producing devices to panels separate from those feeding the system units.

Grounding

A system unit or device must be properly grounded. It is recommended that an insulated green wire ground, the same size as the phase wire, be installed between the branch circuit panel and the receptacle.

To ensure proper grounding, a licensed electrician should check the grounding and receptacles for conformance with the country electrical codes.

Computer Room Emergency Power-Off Controls

As a safety precaution, you should provide room emergency power-off controls for disconnecting the main service wiring that supplies the computer equipment. Install these controls at a convenient place for the operator and next to the main exit doors of the room.

Lightning Protection

You should install lightning protection devices when:

- An overhead power service supplies the primary power.
- The area is subject to electrical storms or equivalent-type power surges.

Power Phase Imbalance

Three versions of rack power distribution units are available. The single-phase unit, feature code 9111, has a detachable line cord and can accept single-phase power or power from one phase of a three-phase source. The two multiphase units, feature codes 9113 and 9114, have attached line cords and connect to two and three phases, respectively, of a three-phase power source.

Systems with any of the power distribution units can cause a load imbalance when connected to a three-phase power source. You should consult a licensed electrician to properly balance the loads when new or additional systems are to be connected to a three-phase source.

Power Phase Rotation

The phase rotation (sequence) is not critical for the rack multiphase power distribution units (feature codes 9113 and 9114). The system operates correctly with a multiphase distribution unit connected to a 200- to 240-volt single-phase power source (all phases connected to one side of the power source, neutral to the other). Note, however, that the 9114 unit does not have a neutral line circuit breaker and must only be connected to power sources that have a grounded (earthed) neutral.

System Unit and Device Specifications

The following is a summary of the information you can use to compare systems and external removable media, and plan your office space for the RISC System/6000 system. Considerations for the optional disk drawers are also provided.

Electrical and environmental data for the Models 970B, 980B, and 990 POWERservers represents the following two configurations:

- **Maximum entry configuration:** a processor enclosure with eight memory cards and eight I/O cards, a full small computer system interface (SCSI) device drawer with four SCSI devices, and a Battery Backup Unit
- **Maximum configuration:** a processor drawer with eight memory cards and eight I/O cards, a SCSI device drawer with four SCSI devices, eight I/O cards in the optional I/O board, three SCSI disk drawers with four SCSI devices each, and a Battery Backup Unit.

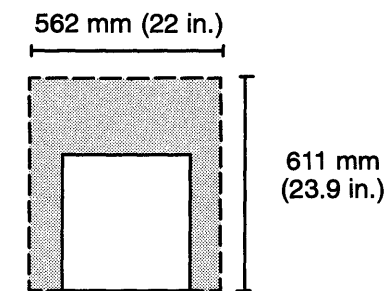
Note: Most configurations for Models 970B, 980B, and 990 fall within the ranges represented by the data for the maximum entry configuration and the maximum configuration.

7008 POWERstations M20/M2A

Dimensions				
Height		413 mm	16.1 in.	
Width		410 mm	16.0 in.	
Depth		459 mm	17.9 in.	
Weight				
Minimum		23.5 kg	52 lbs.	
Maximum		23.5 kg	52 lbs.	
Electrical				
Power source loading (typical in kVA)		0.22		
Voltage range (V ac)		100 to 127 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		550 BTU/hr		
Power requirements (typical)		160 watts		
Power factor		0.5 to 07		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements		Operating	Non-Operating	
(Noncondensing)		8 to 80%	8 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WAd}		5.0 bels	5.0 bels	
L _{pAm}		38 dBA	38 dBA	
<L _{pA} > _m		38 dBA	38 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances		Front	Back	Left
				Right
Install/Air Flow²		N/A	152 mm (6 in.)	76 mm (3 in.)
			76 mm (3 in.)	76 mm (3 in.)
Service		Install so that it can be moved to an area providing 760 mm (30 in.) on each side.		

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



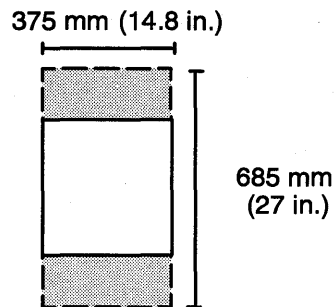
Footprint for M20/M2A

7010 Xstation 130

Dimensions				
Height		72 mm	2.9 in.	
Width		375 mm	14.8 in.	
Depth		380 mm	15.0 in.	
Weight				
Minimum		7.7 kg	17 lbs.	
Maximum		9.5 kg	21 lbs.	
Electrical				
Power source loading (max. in kVA)		0.13		
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		317 BTU/hr		
Power requirements (peak)		65 watts		
Power factor		0.7 (maximum)		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements (Noncondensing)		Operating	Non-Operating	
Wet Bulb		8 to 80% 23°C (73°F)	8 to 80% 27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WAd}		5.0 bels	4.8 bels	
L _{pAm}		40 dBA	39 dBA	
<L _{pA} > _m		37 dBA	36 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



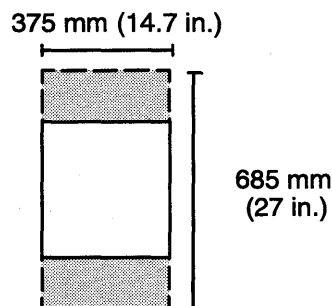
Footprint for Xstation 130

7010 Xstation 140, 150

Dimensions				
Height		72 mm	2.9 in.	
Width		375 mm	14.8 in.	
Depth		380 mm	15.0 in.	
Weight				
Minimum		7.3 kg	16 lbs.	
Maximum		8.6 kg	19 lbs.	
Electrical				
Power source loading (max. in kVA)		0.09		
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (maximum)		317 BTU/hr		
Power requirements (peak)		65 watts		
Power factor		0.7 (maximum)		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements				
		Operating 16 to 32°C (60 to 90°F)	Non-Operating 10 to 43°C (50 to 110°F)	
Humidity Requirements				
(Noncondensing)		Operating 8 to 80%	Non-Operating 8 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹				
		Operating	Idle	
L _{WAd}		4.7 bels	4.7 bels	
L _{pAm}		33 dBA	33 dBA	
<L _{pA} > _m		31 dBA	31 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances				
	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



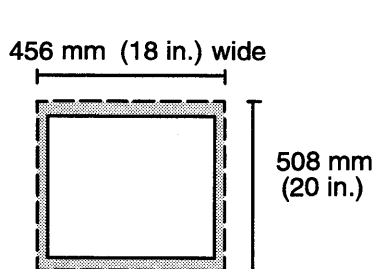
Footprint for Xstation 140, and 150

7011 POWERstation and POWERserver 220 and 230

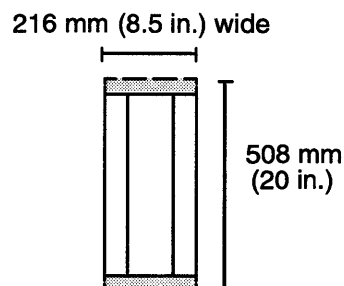
Dimensions		Desktop		Deskside	
Height		84 mm	3.3 in.	432 mm	17 in.
Width ¹		406 mm	16 in.	216 mm	8.5 in.
Depth		419 mm	16.5 in.	419 mm	16.5 in.
Weight					
Minimum			9.0 kg	20 lbs.	
Maximum			11.5 kg	25 lbs.	
Electrical					
Power source loading (typical in kVA)			0.17		
Voltage range (V ac)		100 to 127 or 200 to 240 (autoranging)			
Frequency (hertz)		50 or 60			
Thermal output (typical)		340 BTU/hr			
Power requirements (typical)		100 watts			
Power factor		0.5 to 0.7			
Maximum altitude		2135 m (7000 ft.)			
Temperature Requirements		Operating		Non-Operating	
		16 to 32°C (60 to 90°F)		10 to 43°C (50 to 110°F)	
Humidity Requirements (Noncondensing)		Operating		Non-Operating	
Wet Bulb		8 to 80%		8 to 80%	
		23°C (73°F)		27°C (80°F)	
Noise Emissions ²		Operating		Idle	
L _{WAd}		5.2 bels		5.0 bels	
L _{pAm}		41 dBA		40 dBA	
<L _{pA} > _m		39 dBA		38 dBA	
Impulsive or prominent discrete tones		No		No	
Clearances ³		Front	Back	Left	Right
Install/Air Flow ^{4, 5}	35 mm (1.5 in.)	51 mm (2 in.)	25 mm (1 in.)	25 mm (1 in.)	
Service	466 mm (18 in.)	N/A		N/A	N/A

Notes:

1. Deskside width measurement includes the optional vertical stand.
2. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
3. Left and right measurements apply only when the Model 220 is used in the desktop position.
4. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprints.
5. When placed in the vertical position, the Model 220 requires 25 mm (1 in.) at the bottom and top for proper air flow. The necessary bottom clearance is provided by the optional vertical stand.



Desktop Footprint



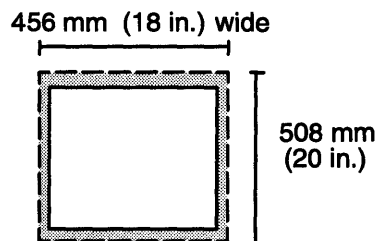
Deskside Footprint Includes Pedestal

7011 POWERstation and POWERserver 250

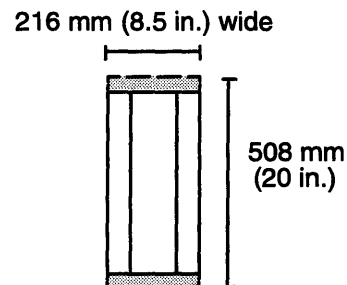
Dimensions		Desktop		Deskside	
Height		84 mm	3.3 in.	432 mm	17 in.
Width ¹		406 mm	16 in.	216 mm	8.5 in.
Depth		419 mm	16.5 in.	419 mm	16.5 in.
Weight					
Minimum			9.0 kg	20 lbs.	
Maximum			11.5 kg	25 lbs.	
Electrical					
Power source loading (typical in kVA)			0.22		
Voltage range (V ac)			100 to 127 or 200 to 240 (autoranging)		
Frequency (hertz)			50 or 60		
Thermal output (typical)			307 BTU/hr		
Power requirements (typical)			140 watts		
Power factor			0.5 to 0.7		
Maximum altitude			2135 m (7000 ft.)		
Temperature Requirements		Operating		Non-Operating	
		16 to 32°C (60 to 90°F)		10 to 43°C (50 to 110°F)	
Humidity Requirements (Noncondensing)		Operating		Non-Operating	
		8 to 80%		8 to 80%	
Wet Bulb		23°C (73°F)		27°C (80°F)	
Noise Emissions²		Operating		Idle	
L _{WAd}		5.2 bels		5.0 bels	
L _{pAm}		41 dBA		40 dBA	
<L _{pA} > _m		39 dBA		38 dBA	
Impulsive or prominent discrete tones		No		No	
Clearances³		Front	Back	Left	Right
Install/Air Flow^{4, 5}		35 mm (1.5 in.)	51 mm (2 in.)	25 mm (1 in.)	25 mm (1 in.)
Service		466 mm (18 in.)	N/A	N/A	N/A

Notes:

1. Deskside width measurement includes the optional vertical stand.
2. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
3. Left and right measurements apply only when the Model 250 is used in the desktop position.
4. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprints.
5. When placed in the vertical position, the Model 250 requires 25 mm (1 in.) at the bottom and top for proper air flow. The necessary bottom clearance is provided by the optional vertical stand.



Desktop Footprint



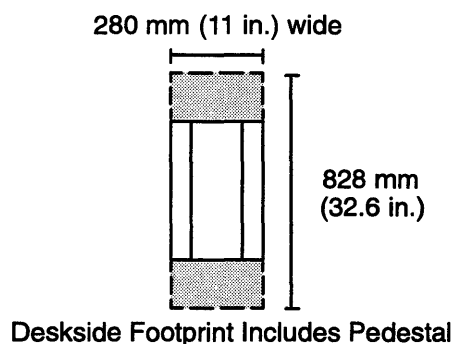
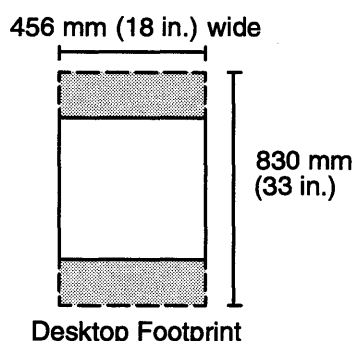
Deskside Footprint Includes Pedestal

7012 POWERstation and POWERserver 34H, 355, 360, 365, 370, and 375

Dimensions		Desktop		Deskside	
Height		162 mm	6.4 in.	466 mm	18.3 in.
Width (at pedestal for deskside)		456 mm	18 in.	280 mm	11 in.
Depth		523 mm	20.6 in.	523 mm	20.6 in.
Weight					
Minimum		12.7 kg	28 lbs.	12.7 kg	28 lbs.
Maximum		15.4 kg	34 lbs.	15.4 kg	34 lbs.
Electrical					
Power source loading (typical in kVA)		0.29			
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)			
Frequency (hertz)		50 or 60			
Thermal output (typical)		585 BTU/hr			
Power requirements (typical)		185 watts			
Power factor		0.5 to 0.7			
Maximum altitude		2135 m (7000 ft.)			
Temperature Requirements		Operating		Non-Operating	
		16 to 32°C (60 to 90°F)		10 to 43°C (50 to 110°F)	
Humidity Requirements (Noncondensing)		Operating		Non-Operating	
		8 to 80%		8 to 80%	
Wet Bulb					
		23°C (73°F)		27°C (80°F)	
Noise Emissions¹		Operating		Idle	
L _{WAd}		5.7 bels		5.5 bels	
L _{pAm}		45 dBA		45 dBA (desktop)	
		N/A		N/A (deskside)	
<L _{pA} > _m		41 dBA		41 dBA (desktop)	
		38 dBA		38 dBA (deskside)	
Impulsive or prominent discrete tones		No		No	
Clearances		Front	Back	Left	Right
Install/Air Flow²		152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service		760 mm (30 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprints.

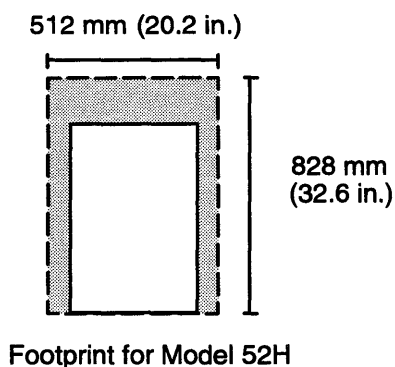


7013 POWERstation and POWERserver 52H

Dimensions				
Height		610 mm	24 in.	
Width		360 mm	14.2 in.	
Depth		675 mm	26.6 in.	
Weight				
Minimum		36.7 kg	81 lbs.	
Maximum		53.1 kg	117 lbs.	
Electrical				
Power source loading (typical in kVA)		0.4		
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		975 BTU/hr		
Power requirements (typical)		285 watts		
Power factor		0.8 to 1.0		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements		Operating	Non-Operating	
(Noncondensing)		8 to 80%	8 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WAd}		5.7 bels	5.5 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		39 dBA	38 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances		Front	Back	Left
				Right
Install/Air Flow²		N/A	152 mm (6 in.)	76 mm (3 in.)
			76 mm (3 in.)	76 mm (3 in.)
Service		Install so that it can be moved to an area providing 760 mm (30 in.) on each side.		

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.

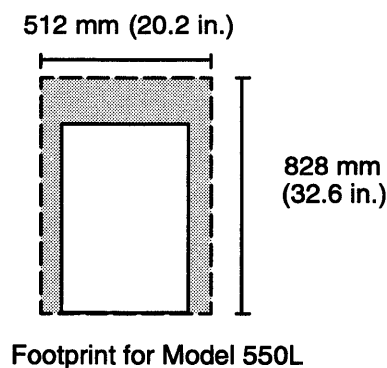


7013 POWERstation and POWERserver 550L

Dimensions				
Height		610 mm	24 in.	
Width		360 mm	14.2 in.	
Depth		675 mm	26.6 in.	
Weight				
Minimum		36.7 kg	81 lbs.	
Maximum		53.1 kg	117 lbs.	
Electrical				
Power source loading (typical in kVA)		0.4		
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		975 BTU/hr		
Power requirements (typical)		285 watts		
Power factor		0.8 to 1.0		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements		Operating	Non-Operating	
(Noncondensing)		8 to 80%	8 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WAd}		5.7 bels	5.5 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		39 dBA	38 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances		Front	Back	Left
				Right
Install/Air Flow²	N/A	152 mm (6 in.)	76 mm (3 in.)	76 mm (3 in.)
Service				
Install so that it can be moved to an area providing 760 mm (30 in.) on each side.				

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.

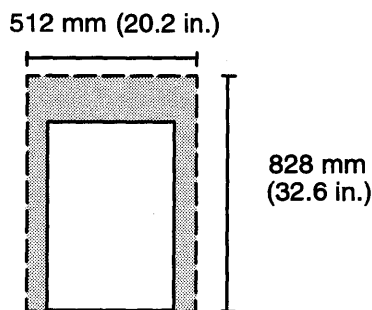


7013 POWERstation and POWERserver 570 and 580

Dimensions				
Height		610 mm	24 in.	
Width		360 mm	14.2 in.	
Depth		675 mm	26.6 in.	
Weight				
Minimum		36.7 kg	81 lbs.	
Maximum		53.1 kg	117 lbs.	
Electrical				
Power source loading (typical in kVA)		0.42		
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		1450 BTU/hr		
Power requirements (typical)		475 watts		
Power factor		0.8 to 1.0		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements				
		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements				
(Noncondensing)		Operating	Non-Operating	
		8 to 80%	8 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹				
		Operating	Idle	
L _{WAd}		5.7 bels	5.5 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		39 dBA	38 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances				
	Front	Back	Left	Right
Install/Air Flow²	N/A	152 mm (6 in.)	76 mm (3 in.)	76 mm (3 in.)
Service				
	Install so that it can be moved to an area providing 760 mm (30 in.) on each side.			

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



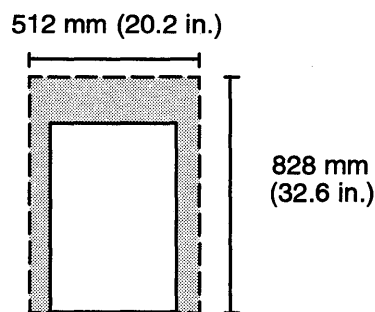
Footprint for Model 570 and 580

7013 POWERstation and POWERserver 58H and 590

Dimensions				
Height		610 mm	24 in.	
Width		360 mm	14.2 in.	
Depth		675 mm	26.6 in.	
Weight				
Minimum		36.7 kg	81 lbs.	
Maximum		53.1 kg	117 lbs.	
Electrical				
Power source loading (typical in kVA)		0.5		
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		1706 BTU/hr		
Power requirements (typical)		475 watts		
Power factor		0.8 to 1.0		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements		Operating	Non-Operating	
(Noncondensing)		8 to 80%	8 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WAd}		6.0 bels	5.5 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		39 dBA	38 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances		Front	Back	Left
				Right
Install/Air Flow²		N/A	152 mm (6 in.)	76 mm (3 in.)
			76 mm (3 in.)	76 mm (3 in.)
Service		Install so that it can be moved to an area providing 760 mm (30 in.) on each side.		

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



Footprint for Model 58H and 590

7015 POWERserver 970B and 980B

Dimensions				
Height		1578 mm	62 in.	
Width		650 mm	25.5 in.	
Depth		921 mm	36.0 in.	
Weight				
Minimum		205kg	450 lbs.	
Maximum		441kg	970 lbs.	
Electrical	Maximum Entry Configuration	Maximum Configuration		
Power source loading (typical in kVA)	1.0	2.4		
Voltage range (V ac)	200 to 240 or -48V dc	200 to 240 or -48V dc		
Frequency (hertz)	50 or 60	50 or 60		
Thermal output (typical)	2165 BTU/hr	4100 BTU/hr		
Power requirements (typical)	634 watts	1200 watts		
Power factor ⁴	0.5 to 0.7	0.5 to 0.7		
Maximum altitude	2135 m (7000 ft.)	2135 m (7000 ft.)		
Temperature Range	Operating	Non-Operating		
	10 to 40°C (50 to 104°F)	10 to 52°C (50 to 125°F)		
Humidity (Noncondensing)				
Without tape drive	8 to 80%	8 to 80%		
With tape drive	20 to 80%	20 to 80%		
Wet Bulb Requirements				
Without tape drive	27°C (80°F)	27°C (80°F)		
With tape drive	23°C (73°F)	27°C (80°F)		
Noise Emissions^{1, 2}	Operating	Idle		
L _{WAd}	6.4 bels	6.2 bels		
L _{pAm}	N/A	N/A		
<L _{pA} > _m	49 dBA	47 dBA		
Impulsive or prominent discrete tones	No	No		
Clearances³	Front	Back	Left	Right
Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow.			
Service	1650 mm (65 in.)	760 mm (30 in.)	915 mm (36 in.)	915 mm (36 in.)

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. Noise emissions data for the 7015 system unit is based on the following configuration: a processor drawer with eight memory cards and eight I/O cards, a SCSI device drawer with four SCSI devices, the second eight I/O slots with eight asynchronous cards, two SCSI disk drawers with four SCSI devices each, and a Battery Backup Unit. Noise emissions data for the SCSI disk drawer is therefore included in the data.
3. For multiple racks placed side by side, the left and right clearances apply only to the leftmost and rightmost rack. For five to six racks placed side by side, the left and right clearances need to be increased to 1525 mm (60 in.). Having more than six racks side by side is not recommended.
4. Power factor is 0.7 to 0.9 without a Battery Backup Unit.
5. The figures for power source loading, thermal output, and power requirement represent maximums. Please work with your IBM representative to determine the typical figures for your configuration.

7015 POWERserver 990

Dimensions				
Height		1578 mm	62 in.	
Width		650 mm	25.5 in.	
Depth		921 mm	36.0 in.	
Weight				
Minimum		205kg	450 lbs.	
Maximum		441kg	970 lbs.	
Electrical	Maximum Entry Configuration	Maximum Configuration		
Power source loading (typical in kVA)	1.0	2.4		
Voltage range (V ac)	200 to 240 or -48V dc	200 to 240 or -48V dc		
Frequency (hertz)	50 or 60	50 or 60		
Thermal output (typical)	2165 BTU/hr	4100 BTU/hr		
Power requirements (typical)	634 watts	1200 watts		
Power factor ⁴	0.5 to 0.7	0.5 to 0.7		
Maximum altitude	2135 m (7000 ft.)	2135 m (7000 ft.)		
Temperature Range	Operating	Non-Operating		
Humidity (Noncondensing)	16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)		
Without tape drive	8 to 80%	8 to 80%		
With tape drive	20 to 80%	20 to 80%		
Wet Bulb Requirements	23°C (73°F)	27°C (80°F)		
Noise Emissions^{1, 2}	Operating	Idle		
LWAd	6.4 bels	6.2 bels		
LpAm	N/A	N/A		
<LpA> _m	49 dBA	47 dBA		
Impulsive or prominent discrete tones	No	No		
Clearances³	Front	Back	Left	Right
Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow.			
Service	1650 mm (65 in.)	760 mm (30 in.)	915 mm (36 in.)	915 mm (36 in.)

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. Noise emissions data for the 7015 system unit is based on the following configuration: a Processor Drawer with eight memory cards and eight I/O cards, a SCSI Device Drawer with four SCSI devices, the second eight I/O slots with eight asynchronous cards, two SCSI Disk Drawers with four SCSI devices each, and a Battery Backup Unit. Noise emissions data for the SCSI Disk Drawer is therefore included in the data.
3. For multiple racks placed side by side, the left and right clearances apply only to the leftmost and rightmost rack. For five to six racks placed side by side, the left and right clearances need to be increased to 1525 mm (60 in.). Having more than six racks side by side is not recommended.
4. Power factor is 0.7 to 0.9 without a Battery Backup Unit.
5. The figures for power source loading, thermal output, and power requirement represent maximums. Please work with your IBM representative to determine the typical figures for your configuration.

7015 SCSI and Device Disk Drawers

Dimensions		
Height	171 mm	6.7 in. (4 EIA units)
Width	443 mm	17.4 in.
Depth	686 mm	27.0 in.
Weight		
Minimum	25 kg	55 lbs.
Maximum	48 kg	105 lbs.
Electrical		
Power source loading (typical in kVA)	0.34	
Voltage range (V ac)	200 to 240	
Frequency (hertz)	50 or 60	
Thermal output (typical)	580 BTU/hr	
Power requirements (typical)	170 watts	
Power factor	0.5 to 0.7	
Maximum altitude	2135 m (7000 ft.)	
Temperature Requirements	Operating	Non-Operating
	10 to 40°C (50 to 104°F)	10 to 52°C (50 to 125°F)
Humidity (Noncondensing)	Operating	Non-Operating
Without tape drive	8 to 80%	8 to 80%
With tape drive	20 to 80%	20 to 80%
Wet Bulb Requirements		
Without tape drive	27°C (80°F)	27°C (80°F)
With tape drive	23°C (73°F)	27°C (80°F)
Noise Emissions		
Data included with calculations for the 7015 POWERservers.		

1/2-Inch 9-Track Tape Drive Drawer

Dimensions		
Height	222 mm	8.75 in. (6 EIA units)
Width	483 mm	19 in.
Depth	679 mm	26.75 in.
Weight		
Minimum	48.2 kg	105 lbs.
Maximum	48.2 kg	105 lbs.
Electrical		
Power source loading (typical in kVA)	0.2	
Voltage range (V ac)	100 to 125 or 200 to 240 (selectable)	
Frequency (hertz)	50 or 60	
Thermal output (typical)	410 BTU/hr	
Power requirements (typical)	120 watts	
Power factor	0.5 to 0.7	
Maximum altitude	2135 m (7000 ft.)	
Temperature Requirements	Operating	Non-Operating
	16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)
Humidity Requirements	Operating	Non-Operating
(Noncondensing)	20 to 80%	20 to 80%
Wet Bulb	23°C (73°F)	27°C (80°F)

IBM 3490E Enhanced Magnetic Tape Subsystem

Dimensions				
Height	24.5 in	622 mm		
Width	18.6 in	479 mm		
Depth	34.9 in	885 mm		
Weight				
C11	198 lbs	90 kg		
C22	260 lbs	118 kg		
Electrical				
Power source loading (typical in kVA)				
C11		0.57		
C22		0.90		
Temperature Requirements		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements		Operating	Non-Operating	
(Noncondensing)		20 to 80 %		
Wet Bulb		25.6°C		
Noise Emissions¹		Operating	Idle	
C11		6.1B	5.8B	
C22		6.4B	6.3B	
Clearances	Front	Back	Left	Right
Service	Install so that it can be moved to an area providing 760 mm (30 in.) on each side.			

Note:

See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.

IBM 3995 Model 063

Dimensions				
Height		681 mm	26.8 in.	
Width		375 mm	14.8 in.	
Depth		805 mm	31.7 in.	
Weight				
Minimum		93 kg	205 lbs.	
Maximum			N/A	
Electrical				
Power source loading (typical in kVA)			0.13	
Voltage range (V ac)		100 to 127 or 200 to 240 (selectable)		
Frequency (hertz)			50 or 60	
Thermal output (typical)			400 BTU/hr	
Maximum altitude			2135 m (7000 ft.)	
Temperature Requirements				
		Operating		
		10 to 38°C (50 to 100°F)		
Humidity Requirements		Operating	Non-Operating	
(Noncondensing)		8 to 80%	8 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WA} d		6.0 bels	5.5 bels	
L _{pA} m		N/A	N/A	
<L _{pA} > _m		43 dBA	37 dBA	
Impulsive noise		Yes	No	
Prominent discrete tones		No	No	
Clearances	Front	Back	Left	Right
Install/Air Flow	1020mm (40 in)	1020mm (40 in)	559mm (22 in)	559mm (22 in)
Service				
Install so that it can be moved to an area providing 760 mm (30 in.) on each side.				

Note:

See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.

IBM 3995 Model 163

Dimensions				
Height		1800 mm	70.9 in.	
Width		692 mm	27.3 in.	
Depth		943 mm	37.1 in.	
Weight				
Minimum		408 kg	900 lbs.	
Maximum			N/A	
Electrical				
Power source loading (typical in kVA)			0.13	
Voltage range (V ac)			200 to 240	
Frequency (hertz)			50 or 60	
Thermal output (typical)			750 BTU/hr	
Maximum altitude			2135 m (7000 ft.)	
Temperature Requirements		Operating	Non-Operating	
		16 to 32°C(60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements (Noncondensing)		Operating	Non-Operating	
Wet Bulb		8 to 80%	8 to 80%	
		23°C (73°F)	27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WAd}		6.5 bels	5.5 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		46 dBA	42 dBA	
Impulsive noise		Yes	No	
Prominent discrete tones		No	No	
Clearances	Front	Back	Left	Right
Install/Air Flow	1020mm (40 in)	1020mm (40 in)	559mm (22 in)	559mm (22 in)
Service	Install so that it can be moved to an area providing 760 mm (30 in.) on each side.			

Note:

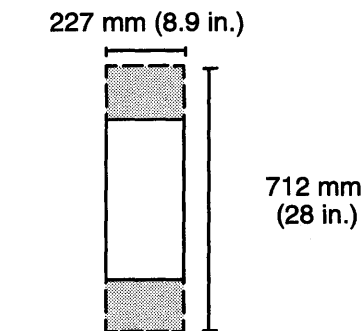
See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.

IBM 4869 Model 002 5 1/4-Inch 1.2MB External Diskette Drive

Dimensions				
Height		62.5 mm	2.5 in.	
Width		227 mm	8.9 in.	
Depth		408 mm	16.0 in.	
Weight				
Minimum		2.1 kg	4.6 lbs.	
Maximum		2.1 kg	4.6 lbs.	
Electrical				
Power source loading (typical in kVA)		0.02		
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		35 BTU/hr		
Power requirements (typical)		10 watts		
Power factor		N/A		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements		Operating	Non-Operating	
		10 to 40°C (50 to 104°F)	10 to 52°C (50 to 125°F)	
Humidity Requirements (Noncondensing)		Operating	Non-Operating	
ANSI Media		8 to 80%	5 to 95%	
ISO Media		20 to 80%	5 to 95%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WAd}		6.0 bels	N/A	
L _{pAm}		54 dBA	N/A	
<L _{pA} > _m		42 dBA	N/A	
Impulsive or prominent discrete tones		Yes	No	
Clearances	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service	152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



4869 Model 002 Footprint

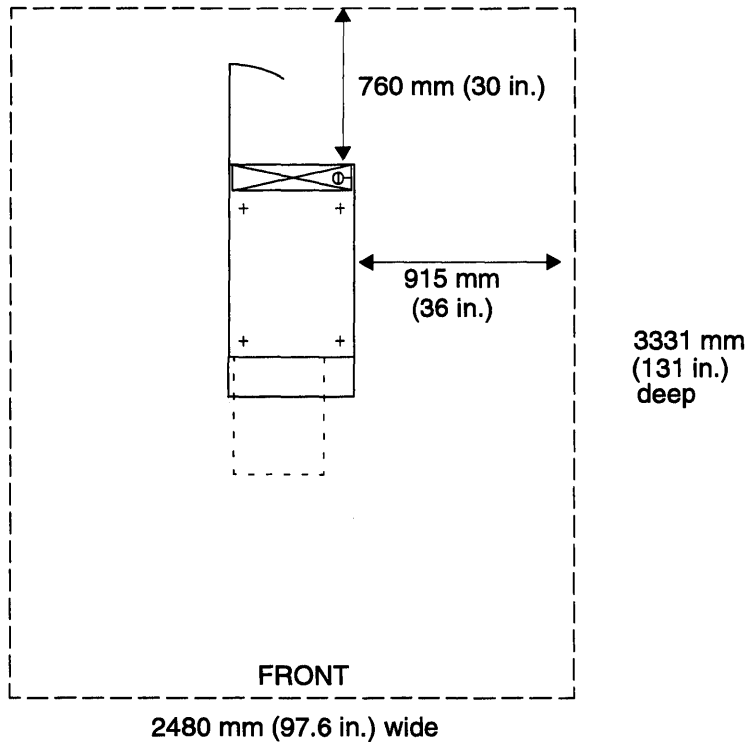
IBM 7202 Model 900 Expansion Rack

Dimensions				
Height		1578 mm	62.0 in.	
Width		650 mm	25.5 in.	
Depth		921 mm	36.0 in.	
Weight				
Minimum		136 kg	300 lbs.	
Maximum		470 kg	1035 lbs.	
Electrical¹				
Power source loading (typical in kVA)		0 .004		
Voltage range (V ac)		200 to 240 or -48V dc		
Frequency (hertz)		50 or 60		
Thermal output (typical)		15 BTU/hr		
Power requirements (typical)		4 watts		
Power factor		0.5 to 0.7		
Maximum altitude		2135 m (7000 ft.)		
Temperature Range		Operating 10 to 40°C (50 to 104°F)	Non-Operating 10 to 52°C (50 to 125°F)	
Humidity Requirements (Noncondensing)		Operating 8 to 80%	Non-Operating 8 to 80%	
Wet Bulb		27°C (80°F)	27°C (80°F)	
Noise Emissions^{1, 2}		Operating	Idle	
LWAd		6.2 bels	6.0 bels	
LpAm		N/A	N/A	
<LpA>m		48 dBA	46 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances³	Front	Back	Left	Right
Install/Air Flow	Maintenance of a proper service clearance should allow proper air flow.			
Service	1650 mm (65 in.)	760 mm (30 in.)	915 mm (36 in.)	915 mm (36 in.)

Notes:

1. No features installed.
2. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
3. Noise emissions data for the 7202 Model 900 is based on the following configuration: two 9334 Model 10 Drawers with two disk drives in each and two 9334 Model 10 Drawers with three disk drives in each.

The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



Footprint for the 7202 Model 900

Note: Rack units are large and heavy and are not easily moved. Because maintenance activities require access at both the front and back, extra room needs to be allowed. The footprint shows the radius of the swinging door on the rear of the rack and a drawer in the extended position. The illustration shows the minimum space required.

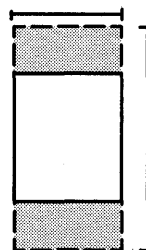
IBM 7203 Model 001 External Portable Disk Drive

Dimensions			
Height	160 mm	6.3 in.	
Width	280 mm	11.0 in.	
Depth	345 mm	13.6 in.	
Weight			
Minimum	6.12 kg	13.5 lbs.	(without module)
Maximum	10.3 kg	22.6 lbs.	(with a 355 or 670MB module)
Electrical			
Power source loading (typical in kVA)		0.08	
Voltage range (V ac)	100 to 125 or 200 to 240	(autoranging)	
Frequency (hertz)		50 or 60	
Thermal output (typical)		155 BTU/hr	
Power requirements (typical)		45 watts	
Power factor		0.5 to 0.7	
Maximum altitude		2135 m (7000 ft.)	
Temperature Requirements		Operating	Non-Operating
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)
Humidity Requirements (Noncondensing)		Operating	Non-Operating
Wet Bulb		8 to 80%	8 to 80%
		23°C (73°F)	27°C (80°F)
Noise Emissions¹		Operating	Idle
L _{WAd}		5.8 bels	5.6 bels
L _{pAm}		N/A	N/A
<L _{pA} > _m		42 dBA	41 dBA
Impulsive or prominent discrete tones		No	No
Clearances		Front	Back
		Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A
Service	152 mm (6 in.)	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.

280 mm (11 in.)



649 mm
(25.6 in.)

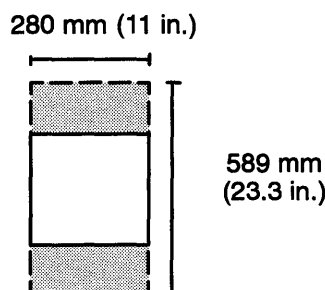
7203 Model 001 Footprint

IBM 7204 Model 320 320MB and Model 001 1GB External Disk Drive

Dimensions				
Height		80 mm	3.3 in.	
Width		280 mm	11.0 in.	
Depth		285 mm	11.3 in.	
Weight				
Minimum		4.7 kg	10.3 lbs.	
Maximum		4.7 kg	10.3 lbs.	
Electrical				
Power source loading (typical in kVA)		0.07		
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		110 BTU/hr		
Power requirements (typical)		32 watts		
Power factor		0.5 to 0.7		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements				
		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements				
(Noncondensing)		Operating	Non-Operating	
		8 to 80%	8 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹				
		Operating	Idle	
L _{WA} d		5.6 bels	5.6 bels	
L _{pA} m		N/A	N/A	
<L _{pA} > _m		40 dBA	40 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service	152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



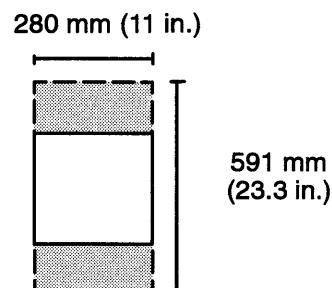
7204 Model 320 and 7204
Model 001 Footprint

IBM 7204 Model 010 1GB External Disk Drive (SCSI-2)

Dimensions				
Height	79 mm	3.13 in.		
Width	280 mm	11.0 in.		
Depth	287 mm	11.3 in.		
Weight				
Minimum	3.9 kg	8.45 lbs.		
Maximum	3.9 kg	8.45 lbs.		
Electrical				
Power source loading (typical in kVA)	0.07			
Voltage range (V ac)	100 to 125 or 200 to 240 (autoranging)			
Frequency (hertz)	50 or 60			
Thermal output (typical)	110 BTU/hr			
Power requirements (typical)	32 watts			
Power factor	0.5 to 0.7			
Maximum altitude	2135 m (7000 ft.)			
Temperature Requirements	Operating	Non-Operating		
	16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)		
Humidity Requirements	Operating	Non-Operating		
(Noncondensing)	8 to 80%	8 to 80%		
Wet Bulb	23°C (73°F)	27°C (80°F)		
Noise Emissions¹	Operating	Idle		
L _{WAd}	5.3 bels	5.3 bels		
L _{pAm}	N/A	N/A		
<L _{pA} > _m	45 dBA	44 dBA		
Impulsive or prominent discrete tones	No	No		
Clearances	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service	152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



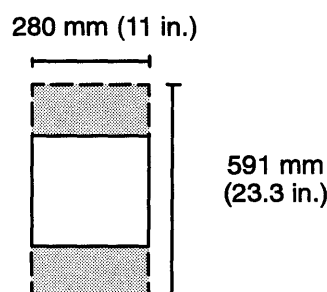
7204 Model 010 Footprint

IBM 7204 Model 215 2GB External Disk Drive (Differential SCSI-2)

Dimensions				
Height	79 mm	3.13 in.		
Width	280 mm	11.0 in.		
Depth	287 mm	11.3 in.		
Weight				
Minimum	4.2 kg	9.25 lbs.		
Maximum	4.2 kg	9.25 lbs.		
Electrical				
Power source loading (typical in kVA)	0.07			
Voltage range (V ac)	100 to 125 or 200 to 240 (autoranging)			
Frequency (hertz)	50 or 60			
Thermal output (typical)	110 BTU/hr			
Power requirements (typical)	32 watts			
Power factor	0.5 to 0.7			
Maximum altitude	2135 m (7000 ft.)			
Temperature Requirements		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements (Noncondensing)		Operating	Non-Operating	
		8 to 80%	8 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions ¹		Operating	Idle	
L _{WAd}		5.3 bels	5.3 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		45 dBA	44 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances	Front	Back	Left	Right
Install/Air Flow ²	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service	152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



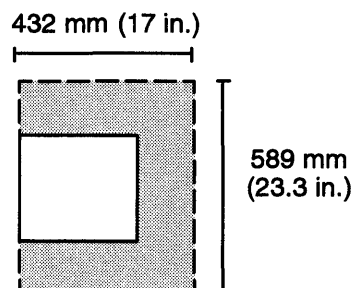
7204 Model 215 Footprint

IBM 7206 Models 001 and 005 External 4-mm Tape Drives

Dimensions				
Height		80 mm	3.3 in.	
Width		280 mm	11.0 in.	
Depth		285 mm	11.3 in.	
Weight				
Minimum		5 kg	11 lbs.	
Maximum		5 kg	11 lbs.	
Electrical				
Power source loading (typical in kVA)		0.08		
Voltage range (V ac)		100 to 127 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		110 BTU/hr		
Power requirements (typical)		32 watts		
Power factor		0.5 to 0.7		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements		Operating	Non-Operating	
(Noncondensing)		20 to 80%	20 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WAd}		5.9 bels	5.5 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		46 dBA	40 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	152 mm (6 in.)
Service	152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



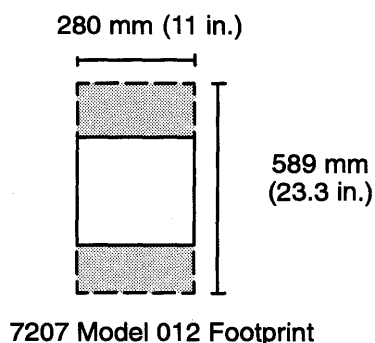
7206 Model 001 and 7206 Model 005 Footprint

IBM 7207 Model 012 1.2GB External 1/4-Inch Cartridge Tape Drive

Dimensions				
Height		80 mm	3.3 in.	
Width		280 mm	11.0 in.	
Depth		285 mm	11.3 in.	
Weight				
Minimum		4.5 kg	10.0 lbs.	
Maximum		4.5 kg	10.0 lbs.	
Electrical				
Power source loading (typical in kVA)		0.07		
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		140 BTU/hr		
Power requirements (typical)		40 watts		
Power factor		0.5 to 0.7		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements				
		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements				
(Noncondensing)		Operating	Non-Operating	
Wet Bulb		20 to 80%	20 to 80%	
		23°C (73°F)	27°C (80°F)	
Noise Emissions¹				
		Operating	Idle	
L _{WAd}		6.6 bels	5.3 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		46 dBA	40 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances				
	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service	152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.

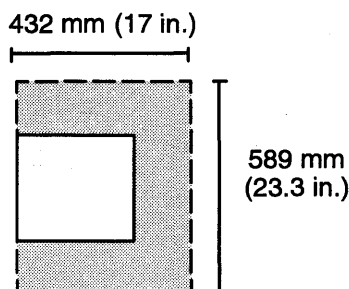


IBM 7208 Model 001 2.3GB External 8-mm Tape Drive

Dimensions				
Height		123 mm	4.8 in.	
Width		280 mm	11.0 in.	
Depth		285 mm	11.3 in.	
Weight				
Minimum		6 kg	13.3 lbs.	
Maximum		6 kg	13.3 lbs.	
Electrical				
Power source loading (typical in kVA)			0.06	
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)			50 or 60	
Thermal output (typical)			120 BTU/hr	
Power requirements (typical)			35 watts	
Power factor			0.5 to 0.7	
Maximum altitude			2135 m (7000 ft.)	
Temperature Requirements		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements (Noncondensing)		Operating	Non-Operating	
Wet Bulb		20 to 80%	20 to 80%	
		23°C (73°F)	27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WAd}		5.9 bels	5.5 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		46 dBA	40 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	152 mm (6 in.)
Service	152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



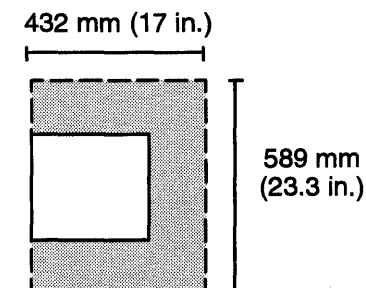
7208 Model 001 Footprint

IBM 7208 Model 011 5/10GB External 8-mm Tape Drive

Dimensions				
Height		80 mm	3.3 in.	
Width		280 mm	11.0 in.	
Depth		285 mm	11.3 in.	
Weight				
Minimum		4.7 kg	10.3 lbs.	
Maximum		4.7 kg	10.3 lbs.	
Electrical				
Power source loading (typical in kVA)		0.06		
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		120 BTU/hr		
Power requirements (typical)		35 watts		
Power factor		0.5 to 0.7		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements				
		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements				
(Noncondensing)		Operating	Non-Operating	
		20 to 80%	20 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹				
		Operating	Idle	
L _{WAd}		5.9 bels	5.5 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		46 dBA	40 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	152 mm (6 in.)
Service	152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



7208 Model 011 Footprint

IBM 7209 Model 001 External Rewritable Optical Disk Drive

Dimensions				
Height		123 mm	4.8 in.	
Width		280 mm	11.0 in.	
Depth		290 mm	11.5 in.	
Weight				
Minimum		6.3 kg	14 lbs.	
Maximum		6.3 kg	14 lbs.	
Electrical				
Power source loading (typical in kVA)		0.053		
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		110 BTU/hr		
Power requirements (typical)		33 watts		
Power factor		0.5 to 0.7		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements		Operating 16 to 32°C (60 to 90°F)	Non-Operating 1 to 60°C (34 to 140°F)	
Humidity Requirements (Noncondensing)		Operating 10 to 80%	Non-Operating 10 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WAd}		5.5 bels	5.4 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		42 dBA	40 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances	Front	Back	Left	Right
Install/Air Flow	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service	152 mm (6 in.)	N/A	N/A	N/A

Note:

See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.

IBM 7209 Model 002 External Rewritable Optical Disk Drive

Dimensions				
Height		123 mm	4.8 in.	
Width		280 mm	11.0 in.	
Depth		290 mm	11.5 in.	
Weight				
Minimum		6.3 kg	14 lbs.	
Maximum		6.3 kg	14 lbs.	
Electrical				
Power source loading (typical in kVA)		0.053		
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		110 BTU/hr		
Power requirements (typical)		33 watts		
Power factor		0.5 to 0.7		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	1 to 60°C (34 to 140°F)	
Humidity Requirements		Operating	Non-Operating	
(Noncondensing)		10 to 80%	10 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WAd}		5.5 bels	5.5 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		45 dBA	45 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service	152 mm (6 in.)	N/A	N/A	N/A

Note:

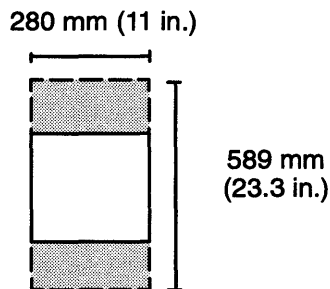
See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.

IBM 7210 Model 001 External CD-ROM Drive

Dimensions				
Height		80 mm	3.3 in.	
Width		280 mm	11.0 in.	
Depth		285 mm	11.3 in.	
Weight				
Minimum		4.9 kg	10.8 lbs.	
Maximum		4.9 kg	10.8 lbs.	
Electrical				
Power source loading (typical in kVA)			0.05	
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		85 BTU/hr		
Power requirements (typical)		25 watts		
Power factor		0.5 to 0.7		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements				
		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements				
(Noncondensing)		Operating	Non-Operating	
		10 to 80%	10 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹				
		Operating	Idle	
LWAd		5.1 bels	5.1 bels	
LpAm		N/A	N/A	
<LpA>m		36 dBA	36 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances				
	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service	152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



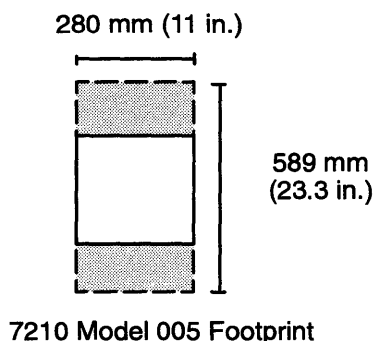
7210 Model 001 Footprint

IBM 7210 Model 005 External CD-ROM Drive

Dimensions				
Height	80 mm	3.3 in.		
Width	280 mm	11.0 in.		
Depth	285 mm	11.3 in.		
Weight				
Minimum	4.9 kg	10.8 lbs.		
Maximum	4.9 kg	10.8 lbs.		
Electrical				
Power source loading (typical in kVA)	0.07			
Voltage range (V ac)	100 to 125 or 200 to 240 (autoranging)			
Frequency (hertz)	50 or 60			
Thermal output (typical)	110 BTU/hr			
Power requirements (typical)	75 watts			
Power factor	0.5 to 0.7			
Maximum altitude	2135 m (7000 ft.)			
Temperature Requirements				
	Operating	Non-Operating		
	16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)		
Humidity Requirements				
(Noncondensing)	Operating	Non-Operating		
	10 to 80%	10 to 80%		
Wet Bulb	23°C (73°F)	27°C (80°F)		
Noise Emissions ¹				
	Operating	Idle		
L _{WAd}	5.5 bels	5.5 bels		
L _{pAm}	N/A	N/A		
<L _{pA} > _m	36 dBA	36 dBA		
Impulsive or prominent discrete tones	No	No		
Clearances				
	Front	Back	Left	Right
Install/Air Flow ²	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service	152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.

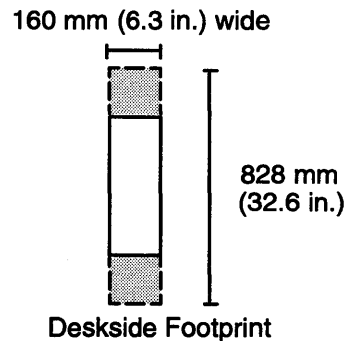
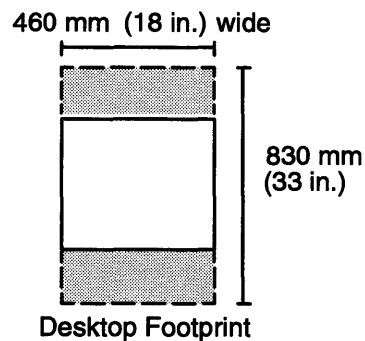


IBM 7235 POWER GTO

Dimensions		Desktop		Deskside	
Height		160 mm	6.3 in.	466 mm	18.3 in.
Width		460 mm	18.0 in.	160 mm	6.3 in.
Depth		525 mm	21.0 in.	525 mm	21.0 in.
Weight					
Minimum		16 kg	35 lbs.	16 kg	35 lbs.
Maximum		16 kg	35 lbs.	16 kg	35 lbs.
Electrical					
Power source loading (typical in kVA)		0.5			
Voltage range (V ac)		100 to 125 or 200 to 240 (autoranging)			
Frequency (hertz)		50 or 60			
Thermal output (typical)		850 BTU/hr			
Power requirements (typical)		250 watts			
Power factor		0.5 to 0.7			
Maximum altitude		2135 m (7000 ft.)			
Temperature Requirements		Operating		Non-Operating	
		16 to 32°C (60 to 90°F)		10 to 43°C (50 to 110°F)	
Humidity Requirements		Operating		Non-Operating	
(Noncondensing)		8 to 80%		8 to 80%	
Wet Bulb		23°C (73°F)		27°C (80°F)	
Noise Emissions¹		Operating		Idle	
L _{WAd}		5.8 bels		5.5 bels	
L _{pAm}		N/A		N/A	
<L _{pA} > _m		54 dBA		N/A	
Impulsive or prominent discrete tones		No		No	
Clearances		Front	Back	Left	Right
Install/Air Flow²		152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service		152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprints.

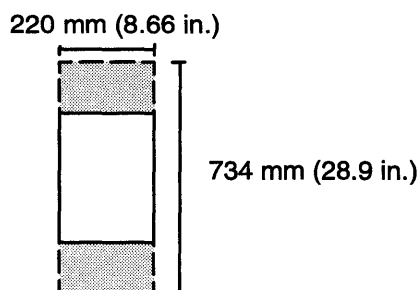


IBM 9291 Single Digital Trunk Processors

Dimensions				
Height		110 mm	4.33 in.	
Width		220 mm	8.66 in.	
Depth		430 mm	16.9 in.	
Weight				
Minimum		7.5 kg	16.5 lbs.	
Maximum		7.5 kg	16.5 lbs.	
Electrical				
Power source loading (typical in kVA)		0.07		
Voltage range (V ac)		100 to 125 or 200 to 240	(autoranging)	
Frequency (hertz)		50 or 60		
Thermal output (typical)		240 BTU/hr		
Power requirements (typical)		70 watts		
Power factor		0.5 to 0.7		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements				
		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements				
(Noncondensing)		Operating	Non-Operating	
		8 to 80%	8 to 80%	
Wet Bulb		27°C (80°F)	27°C (80°F)	
Noise Emissions¹				
		Operating	Idle	
L _{WAd}		4.8 bels	4.8 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		46 dBA	40 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances				
	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service	152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



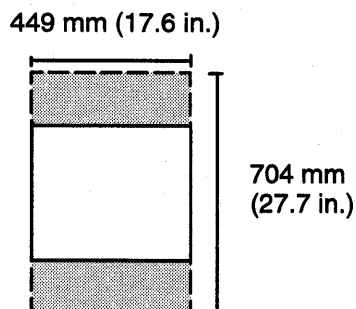
9291 Single Digital Trunk Processor

IBM 9295 Multiple Digital Trunk Processor

Dimensions	Base Unit		Each T1 or CEPT feature		Second Power Supply feature	
Height	266 mm	10.5 in.	264 mm	10.3 in.	264 mm	10.3 in.
Width	449 mm	17.6 in.	50 mm	1.9 in.	69.5 mm	2.7 in.
Depth	400 mm	15.7 in.	373 mm	14.6 in.	373 mm	14.6 in.
Weight						
Minimum	13.2 kg	29.2 lbs.	2.1 kg	4.6 lbs.	5.0 kg	11.0 lbs.
Maximum	13.2 kg	29.2 lbs.	2.1 kg	4.6 lbs.	5.0 kg	11.0 lbs.
Electrical						
Power source loading (typical in kVA)	0.75					
Voltage range (V ac)	100 to 125 or 200 to 240 (autoranging)					
Frequency (hertz)	50 or 60					
Thermal output (typical)	1710 BTU/hr					
Power requirements (typical)	500 watts					
Power factor	0.5 to 0.7					
Maximum altitude	2135 m (7000 ft.)					
Temperature Requirements			Operating		Non-Operating	
			16 to 32°C (60 to 90°F)		10 to 43°C (50 to 110°F)	
Humidity Requirements			Operating		Non-Operating	
(Noncondensing)			8 to 80%		8 to 80%	
Wet Bulb			27°C (80°F)		27°C (80°F)	
Noise Emissions¹			Operating		Idle	
L _{WAd}			5.25 bels		5.25 bels	
L _{pAm}			N/A		N/A	
<L _{pA} > _m			46 dBA		40 dBA	
Impulsive or prominent discrete tones			No		No	
Clearances	Front		Back	Left	Right	
Install/Air Flow²	152 mm (6 in.)		152 mm (6 in.)	N/A	N/A	
Service	152 mm (6 in.)		N/A	N/A	N/A	

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



9295 Multiple Digital Trunk Processor

IBM 9333 Models 010, 011 Drawer High-Performance Subsystem

Dimensions		
Height	171 mm	6.7 in. (4 EIA units)
Width	443 mm	17.4 in.
Depth	686 mm	27.0 in.
Weight		
Minimum	25 kg	55 lbs.
Maximum	49 kg	108 lbs.
Electrical		
Power source loading (typical in kVA)	0.36	
Voltage range (V ac)	200 to 240 or -48 V dc (Model 011 only)	
Frequency (hertz)	50 or 60	
Thermal output (typical)	680 BTU/hr	
Power requirements (typical)	200 watts	
Power factor	0.5 to 0.7	
Maximum altitude	2135 m (7000 ft.)	
Temperature Requirements	Operating	Non-Operating
	10 to 40°C (50 to 104°F)	10 to 52°C (50 to 125°F)
Humidity Requirements	Operating	Non-Operating
(Noncondensing)	8 to 80%	8 to 80%
Wet Bulb	27°C (80°F)	27°C (80°F)
Noise Emissions*	Operating	Idle
L _{WAd}	5.5 bels	5.2 bels
L _{pAm}	N/A	N/A
<L _{pA} > _m	42 dBA	40 dBA
Impulsive or prominent discrete tones	No	No

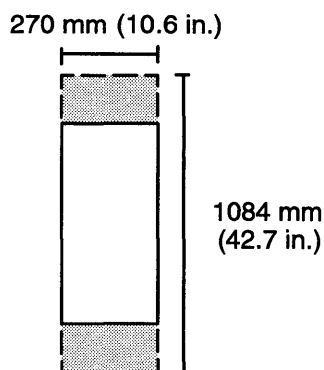
*See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.

IBM 9333 Model 500, 501 Deskside High-Performance Subsystem

Dimensions				
Height		610 mm	24.0 in.	
Width (at pedestal)		270 mm	10.6 in.	
Depth		780 mm	30.7 in.	
Weight				
Minimum		39 kg	85 lbs.	
Maximum		63 kg	138 lbs.	
Electrical				
Power source loading (typical in kVA)		0.37		
Voltage range (V ac)		100 to 125 or 200 to 240 (selectable)		
Frequency (hertz)		50 or 60		
Thermal output (typical)		680 BTU/hr		
Power requirements (typical)		200 watts		
Power factor		0.5 to 0.7		
Maximum altitude		2135 m (7000 ft.)		
Temperature Requirements		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements (Noncondensing)		Operating	Non-Operating	
Wet Bulb		8 to 80%	8 to 80%	
		23°C (73°F)	27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WAd}		5.5 bels	5.3 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		44 dBA	42 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service	152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



9333 Model 500

IBM 9334 Models 010, 011 Drawer Expansion Unit

Dimensions		
Height	171 mm	6.7 in. (4 EIA units)
Width	443 mm	17.4 in.
Depth	686 mm	27.0 in.
Weight		
Minimum	25 kg	55 lbs.
Maximum	43 kg	95 lbs.
Electrical		
Power source loading (typical in kVA)	0.34	
Voltage range (V ac)	200 to 240 or -48 V dc (Model 011 only)	
Frequency (hertz)	50 or 60	
Thermal output (typical)	580 BTU/hr	
Power requirements (typical)	170 watts	
Power factor	0.5 to 0.7	
Maximum altitude	2135 m (7000 ft.)	
Temperature Requirements	Operating 10 to 40°C (50 to 104°F)	Non-Operating 10 to 52°C (50 to 125°F)
Humidity Requirements (Noncondensing)	Operating 8 to 80% 27°C (80°F)	Non-Operating 5 to 80% 27°C (80°F)
Wet Bulb		
Noise Emissions*	Operating	Idle
L _{WAd}	5.5 bels	5.2 bels
L _{pAm}	N/A	N/A
<L _{pA} > _m	42 dBA	40 dBA
Impulsive or prominent discrete tones	No	No

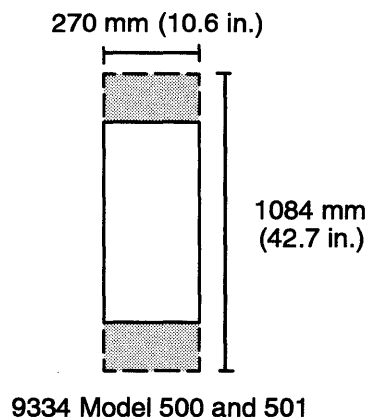
Note: *See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.

IBM 9334 Models 500, 501 Deskside Expansion Unit

Dimensions				
Height		610 mm	24.0 in.	
Width (at pedestal)		270 mm	10.6 in.	
Depth		780 mm	30.7 in.	
Weight				
Minimum		39 kg	85 lbs.	
Maximum		65 kg	142 lbs.	
Electrical				
Power source loading (typical in kVA)			0.4	
Voltage range (V ac)		100 to 125 or 200 to 240 (selectable)		
Frequency (hertz)			50 or 60	
Thermal output (typical)			650 BTU/hr	
Power requirements (typical)			190 watts	
Power factor			0.5 to 0.7	
Maximum altitude			2135 m (7000 ft.)	
Temperature Requirements		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements (Noncondensing)		Operating	Non-Operating	
Wet Bulb		8 to 80%	8 to 80%	
		23°C (73°F)	27°C (80°F)	
Noise Emissions¹		Operating	Idle	
L _{WAd}		5.5 bels	5.3 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		44 dBA	42 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances	Front	Back	Left	Right
Install/Air Flow²	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service	152 mm (6 in.)	N/A	N/A	N/A

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.

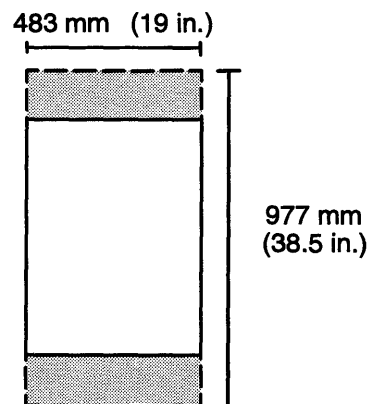


IBM 9348 Model 012 Magnetic Tape Unit

Dimensions				
Height		222 mm	8.75 in.	
Width		483 mm	19.0 in.	
Depth		673 mm	26.5 in.	
Weight				
Minimum		48.2 kg	105 lbs.	
Maximum		48.2 kg	105 lbs.	
Electrical				
Power source loading (typical in kVA)			0.27	
Voltage range (V ac)		100 to 125 or 200 to 240 (selectable)		
Frequency (hertz)			50 or 60	
Thermal output (typical)			410 BTU/hr	
Power requirements (typical)			120 watts	
Power factor			0.5 to 0.7	
Maximum altitude			2135 m (7000 ft.)	
Temperature Requirements				
		Operating	Non-Operating	
		16 to 32°C (60 to 90°F)	10 to 43°C (50 to 110°F)	
Humidity Requirements				
(Noncondensing)		Operating	Non-Operating	
		20 to 80%	20 to 80%	
Wet Bulb		23°C (73°F)	27°C (80°F)	
Noise Emissions¹				
		Operating	Idle	
L _{WAd}		7.0 bels ²	6.8 bels	
L _{pAm}		N/A	N/A	
<L _{pA} > _m		51 dBA ²	50 dBA	
Impulsive or prominent discrete tones		No	No	
Clearances				
	Front	Back	Left	Right
Install/Air Flow³	152 mm (6 in.)	152 mm (6 in.)	N/A	N/A
Service	152 mm (6 in.)	N/A	305 mm (12 in.)	305 mm (12 in.)

Notes:

1. See "Noise Emission Notes" on page 1-296 for definitions of the various noise emissions positions.
2. Data applies when the tape unit is in streaming operating mode.
3. The amount of space needed by the unit during normal operation is indicated by broken lines on the footprint.



9348 Model 012 Footprint

Noise Emission Notes

1. L_{WA_d} is the declared sound power emission level for a production series of machines.
2. L_{pA_m} is the mean value of the sound pressure emission levels at the operator position (if any) for a production series of machines.
3. $\langle L_{pA} \rangle_m$ is the mean value of the space-averaged sound pressure emission levels at the one-meter positions for a production series of machines.
4. N/A = Not Applicable (no operator position).
5. All measurements are made in accordance with ISO DIS 779, and reported in conformance with ISO DIS 7574/4.

Keyboard Information

The following table contains the feature codes and part numbers of keyboards supported for the RISC System/6000. Only these keyboards are supported.

The referenced part number can be found on the bottom of the keyboard.

RISC System/6000 Keyboards		
Country	Feature Code	Part Number
U.S. English	6010	1394540
Belgian-French/ Dutch	6011	1394543
British English	6023	1395985
Canadian French	6012	1394541
Danish	6013	1394544
Dutch (Netherlands)	6034	43G2778
Finnish/Swedish	6014	1394545
French	6015	1394546
German	6016	1394542
Greek	6026	1396078
Icelandic	6024	1395968
Italian	6017	1394547
Japanese-Kanji	6030	30F9388
Norwegian	6019	1394548
Portuguese	6020	1394549
Spanish	6021	1394550
Swiss-French/German	6022	1394551
Turkish (ID 179)	6025	1396079
Turkish (ID 440)	6035	43G2775

System Unit Configuration Options

The following tables present the various internal media configuration options for Models 550L, 570, 580, 58H and 590 system units and the media configurations for the Model 970B, 980B, and 990 SCSI device drawer. Machine Types 7008, 7011, and 7012 do not support additional internal media devices.

Table 1. The following table shows internal media configuration options for Models 550L, 570, 580, 58H, and 590 system units.

Front Panel Slot A	Front Panel Slot B	Front Panel Slot C	Front Panel Slot D
Empty	Empty	Empty	3.5-inch 1.44MB diskette drive
2.3GB 8-mm tape drive		Empty	3.5-inch 1.44MB diskette drive
5.0GB 8-mm tape drive*	Empty	Empty	3.5-inch 1.44MB diskette drive
5.0GB 8-mm tape drive*	4.0GB 4-mm tape drive**	Empty	3.5-inch 1.44MB diskette drive
2.3GB 8-mm tape drive		CD-ROM	3.5-inch 1.44MB diskette drive
5.0GB 8-mm tape drive*	Empty	CD-ROM	3.5-inch 1.44MB diskette drive
5.0GB 8-mm tape drive*	4.0GB 4-mm tape drive**	CD-ROM	3.5-inch 1.44MB diskette drive
Empty	4.0GB 4-mm tape drive**	CD-ROM	3.5-inch 1.44MB diskette drive
Empty	Empty	CD-ROM	3.5-inch 1.44MB diskette drive

*The 5GB 8-mm tape drive is supported on Models 550L, 570, 580, 58H, and 590.

**The 4GB 4-mm tape drive is supported on Models 570, 580, 58H, and 590.

Table 2. The following table shows media configuration options for Models 970B, 980B and 990 SCSI Device Drawer. N/A indicates that the device cannot be used in this slot.

SCSI Device Drawer	Front Panel Slot A	Front Panel Slot B	Front Panel Slot C	Front Panel Slot D
2.3GB 8-mm tape drive	N/A	Optional	Optional	Standard 970B
5GB 8-mm tape drive	N/A	Optional	Optional	Standard 980B
CD-ROM drive	Optional	Optional	Optional	Optional
150MB/1.2GB 1/4-Inch cartridge tape drive	Optional	Optional	Optional	Optional
4GB 4-mm tape drive	Optional	Optional	Optional	Optional

Note: Only one 1/4-inch tape drive per system.

Disk Drive Table for MT 9334

Model 010 Drawer and Model 500 Tower	Maximum
670MB	4
857MB	4
1.0GB	1
1.37GB	4
2.4GB*	3
2.0GB	4
Model 011 Drawer and Model 501 Tower	Maximum
1.0GB	4
2.0GB	4

Note: *Up to seven maximum SCSI addresses per SCSI I/O controller. Each 2.4GB file uses two SCSI IDs.

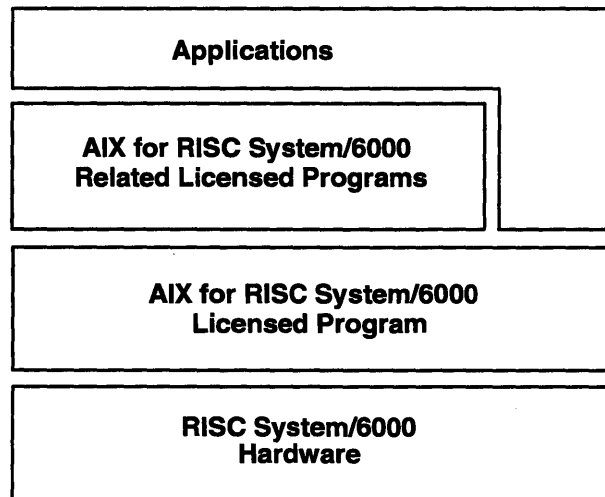
The media slot in the 9334 Model 500 can support only the following combination of media devices:

- One 5.0GB internal 8-mm tape drive
- One 150MB inter 1/4-inch cartridge tape drive
- One 1.2GB internal 1/4-inch cartridge tape drive
- One or two internal CD-ROM disk drive(s)
- One internal CD-ROM drive and one of the following:
 - 150MB internal 1/4-inch cartridge tape drive
 - 1.2GB internal 1/4-inch cartridge tape drive

Chapter 2. Software Overview

Overview of RISC System/6000 Software

The RISC System/6000 system supports a wide variety of application programs. IBM AIX Version 3.2 for RISC System/6000 (AIX is IBM's version of UNIX) serves as the foundation for IBM and non-IBM applications running on the RISC System/6000 system. Once ported, many programs designed to be used with other versions of the AIX operating system can run on the RISC System/6000 system.



RISC System/6000 Software Structure

With the support of AIX for RISC System/6000, the RISC System/6000 system can run applications as diverse as engineering and scientific graphics programs, complex banking and financial programs, and manufacturing control programs.

This section describes the AIX for RISC System/6000 operating system, as well as some basic RISC System/6000 software offerings. For more information about IBM's software offerings for the RISC System/6000 system and other platforms, as well as for information about the software offerings that are generally available from other sources, consult the *AIX Catalog*, GC67-0210, or see your IBM marketing representative.

IBM AIX Version 3.2 for RISC System/6000 Licensed Program

The AIX for RISC System/6000 operating system is designed to optimize performance with RISC System/6000 hardware and to provide user and programming environments that support a standards-driven, open-system environment.

AIX for RISC System/6000 supports multiple users and multiple concurrent tasks, and it contains an assortment of facilities for meeting the needs of widely varied computing environments. Many of these facilities are described in the following sections.

Support for Industry Standards and Specifications

To provide AIX system users with compatible operating system features, AIX for RISC System/6000 has been designed to comply with a number of industry standards.

The following are some standards and specifications that have contributed to the open-environment design of AIX for RISC System/6000 and associated software products:

- AT&T UNIX System V environment. AIX for RISC System/6000 is upwardly compatible from the AT&T UNIX System V environment, is derived from AT&T UNIX System V Release 1, and includes AT&T System V Release 2 and Release 3 extensions required to conform to the AT&T Base System V Interface Definition (SVID) Issue 2, with exceptions as required to conform with alternative standards such as POSIX, ANSI, or X/Open CAE.
- Version 4.3 Berkeley Software Distribution (BSD). AIX for RISC System/6000 offers 4.3 BSD–Reno-compatible function for both end users and programmers. Most 4.3 BSD commands, system calls, and library routines are supported.
- Portable Operating System for Computer Environments (POSIX), IEEE Standard 1003.1-1990. AIX for RISC System/6000 conforms to this standard.
- International Standards Organization (ISO) 9945/1-1990.
- Federal Information Processing Standard (FIPS) 151-2, this is the U.S. government's specification for a portable operating system.
- X/Open Portability Guide Issue 3 (XPG3). AIX for RISC System/6000 has received the XPG3 base brand.
- ANSI C Standard, Document Number X3.159-1989.
- International Standard C ISO/IEC 9899:1990 (E).
- X Window System Version 11, Release 5.
- National Computer Security Center (NCSC) Trusted Computer System Evaluation Criteria (TCSEC) Class C2.
- IBM AIX Family Definition.
- IBM Systems Application Architecture (SAA) Definition.

Specific licensed programs and AIX facilities comply with additional standards. Some of these additional standards are identified in the licensed program descriptions.

To allow data and programs to be ported from other IBM systems to the RISC System/6000 system, the functions available for other IBM products were considered during the design of AIX for RISC System/6000. The following list identifies some of the IBM products and specifications that were considered:

- IBM AIX/RT Operating System Version 2.2.1. AIX for RISC System/6000 is generally source code compatible with AIX/RT Operating System Version 2.2.1 application

programming interfaces (APIs) that are included in AIX for RISC System/6000. As a result, in many cases only recompilation is required to migrate applications from the RT system to the RISC System/6000 system. Applications that use interfaces that have major deviations from standards may require some modification.

- **IBM AIX Family Definition.** AIX for RISC System/6000 complies with the AIX Family Definition, which defines a common operating system environment for multiple IBM processor architectures (IBM System/370 and System/390, the IBM RT system, and the IBM Personal System/2). Such compatibility provides AIX users with tools to create applications that can be ported to other systems running AIX. For a description of the AIX Family Definition, refer to the *IBM AIX Family Definition Overview*, GC23-2002.
- **Systems Application Architecture (SAA).** AIX for RISC System/6000 provides functions that allow interoperability with systems functioning in an SAA environment.

Where any conflicts or differences exist between the previous items, the AIX for RISC System/6000 compatibility priority is:

1. POSIX
2. SVID
3. 4.3 BSD

AIX: An International Solution

One version of AIX for RISC System/6000 is shipped throughout the world. Many of the functions in the operating system support national languages in addition to U.S. English. Through these industry-standard functions, users can interact with the RISC System/6000 system using country-specific language conventions.

International character support benefits multilingual users and multinational corporations by allowing users to create text in many languages on the RISC System/6000 system. Plus, the extensive character set allows users to create text that includes nonalphanumeric symbols (such as many mathematical symbols).

Kernel Features

AIX for RISC System/6000 contains a single-level native kernel that has the following features:

- Support for POSIX IEEE Standard 1003.1, AT&T Base System V, and 4.3 BSD system calls.
- Support for Open Software Foundation (OSF) Application Environment Specification (AES) programming interface.
- Virtual memory management, which performs page fault handling and manages the allocation of real memory, paging space, and virtual storage segments.
- Support for a real-time execution environment, through features such as the following:
 - Multiple interrupt and process priorities
 - Preemptive priority control and scheduling of multiple processes for execution
 - Preemptable kernel for bounded context switch latency
 - Direct control of virtual memory
 - Timer control resolution equal to 10 times processor cycle time.
- Advanced file system and program management that includes the following enhancements:
 - File system mapping to virtual memory
 - Critical file system data logging
 - Symbolic links

- Long file names
 - Dynamic binding, load-time symbol resolution, and enhanced shared libraries
 - Support for a dynamically loadable object file System Build Facilities format, the Extended Common Object File Format (XCOFF)
 - Common linkage conventions for interlanguage calls
 - Support for transfer of AIX/RT Operating System Version 2.2.1 data using backup/restore utilities.
- Disk drive management facilities to support extendable and mirrored file systems. File systems can also span multiple disk drives.
 - Multiple virtual terminal support, allowing users to run several different interactive tasks at the same time (excluding ASCII terminals and displays attached to an IBM Xstation).
 - Interprocess communication (semaphores, sockets, signals, message queues, pipes, and shared memory).

FileTree

The AIX for RISC System/6000 file tree is compatible with other UNIX implementations. Files are separated into six main categories:

- System boot and configuration files (*/*)
- Architecture-dependent, nonchanging files (*/usr*)
- Architecture-dependent, variable files (*/var*)
- Architecture-independent files (*/usr/share*)
- Code-serving files (*/export*)
- Local user files (*/home*).

The licensed programs mentioned in this book conform to the same file tree structure.

Library Routines and Program Development Support

AIX for RISC System/6000 contains enhanced and extended libraries. These enhancements and extensions are designed to support compliance with the various UNIX operating system industry standards.

AIX for RISC System/6000 provides the following support for application program development:

- AIX XL C Compiler/6000 (**cc**, **xlc c89**), a C language compiler that is designed in consideration of the ANSI C Standard, Document Number X3J11/90-014, dated 2/90. The compiler implementation for AIX systems complies with the SAA C level 2 definition, with the exceptions specified in the *XL C User's Guide for IBM AIX Version 3.2 for RISC System/6000*, SC09-1259. The AIX XL C Compiler/6000 is also source compatible with the languages supported by the IBM RT PC C Compiler and the IBM AIX RT PC Advanced C Compiler, with some documented exceptions. The compiler provides compile time options for selecting the desired C language definition: ANSI mode, SAA mode, or EXTENDED mode.
- AIX Assembler (**as**), an assembler that supports instructions sets for PowerPC and POWER architectures. The assembler produces object code in the XCOFF (extended common object file format) object format and supports AIX linkage conventions.
- Absolute debugger (**adb**) debugging tool, a program that allows the programmer to examine, debug, and repair executable binary files, as well as examine non-ASCII data files.

- Symbolic debugger (**dbx**), a symbolic debugging tool that contains a rich set of commands designed to simplify problem determination. The **dbx** debugger supports the Assembler, C, COBOL, FORTRAN, and Pascal programming languages.
- X development environment (**xde**), an interactive multi-window program development environment for debugging application programs, which enables a programmer to control the display of such items as source code, current program state, variable values, error messages, and help text. X development environment requires the IBM AIXwindows Environment/6000 licensed program to run.
- Application Development Facilities (ADF), a set of traditional UNIX system commands and utilities that can aid in various aspects of program development.
 - Source Code Control System (SCCS), which allows programmers to account for and to document changes made to source code and documentation files. With SCCS, programmers can store, update, and retrieve any version of a controlled file. SCCS also helps to protect files from unauthorized changes by controlling update permissions. SCCS records who made changes to a file, when the changes were made, and why changes were made.
 - System Build Facilities (**make**), a utility that maintains up-to-date versions of programs. The **make** command allows a programmer to create a file of instructions for building a large program. The **make** command uses the instructions in this file to maintain an up-to-date version of this program. Each time a change is made to a source file (or a target file is deleted), the programmer can run the **make** command to rebuild the program. If the programmer changes only one file, the **make** program recompiles only that file and relinks that file with the rest of the program.
 - **lex** and **yacc**.
 - C utilities (**cb**, **lint**, **indent**).
 - Object file support (**dump**, **nm**).
- The **libc.a** subroutine library.
- An enhanced, floating-point math library.
- A 4.3 BSD compatibility library.

Shells

AIX for RISC System/6000 provides the following standard command shells:

- Korn shell
- Bourne shell
- C shell.

Security Facilities

AIX for RISC System/6000 provides features that enable configuration of the operating system for increased security (a controlled access mode of operation). Configurable password restrictions and a hidden, encrypted password file make it possible to rigorously identify and authenticate local users. AIX also provides system administration tools for checking the integrity and consistency of system files and tables, as well as for installing programs designed to run in a controlled access mode environment (trusted programs).

Two additional AIX security features are an auditing subsystem and a trusted communication path. The auditing features allow you to record and analyze system events that have security implications and to process the resulting audit trail to extract particular types of data. The trusted communication path provides a method for ensuring the integrity and privacy of sensitive operations.

The AIX system security facilities are designed to meet National Computer Security Center (NCSC) Trusted Computer System Evaluation Criteria (TCSEC) Class C2 security support requirements.

Diskless Workstation Support

AIX for RISC System/6000 provides server and client facilities for two types of system environments:

- Dataless, where the client system's internal disk is used primarily for paging space and dump space. A system must be installed as diskless, then converted to dataless.
- Diskless, where the client system has no local disk and is dependent on a remote server for all of its resources.

Server features

- System administration support for the allocation of resources to designated clients
- Support for remote system startup requests from diskless and dataless clients using UDP/IP remote boot procedure (bootp)
- Support for remote paging requests from diskless and dataless clients
- Support for remote dumping from diskless and dataless clients.

Client features

- Remote boot procedure based on industry-standard bootp. Bootp support resides in read-only storage (ROS) for selected RISC System/6000 workstations.
- Support for receiving configuration information from server.
- Support for paging and dump to remote files.
- NFS and TCP/IP support for remote file system access.

Remote /usr Support

The operating system provides support for use of a remote **/usr** by clients. This support maximizes the disk space available for client applications while allowing clients to have the full resources of the sharable files in the server's **/usr**. Network File System (NFS) is used to mount the remote **/usr**.

Unlike a diskless or dataless machine, a machine accessing **/usr** remotely does not require read-only storage (ROS) support for remote boot.

Base Graphics Support

AIX for RISC System/6000 provides the following graphics support:

- UNIX operating system graphics tools, including the **graph**, **spline**, and **tplot** commands
- Computer Graphics Interface (CGI) device drivers, which provide the execution support for hardcopy graphics on AIX graphics devices and screen output for the IBM AIX Computer Graphics Interface Toolkit/6000 licensed program
- PostScript printer support.

Screen Editors

AIX for RISC System/6000 contains the following full-screen editors:

- vi editor
- INed editor, a full-function general-purpose editor that supports the creation and editing of either ASCII files or structured files.

System Management Facilities

Enhanced installation and system management facilities include the following functions:

- System Management Interface Tool (SMIT), a set of menu-driven services that facilitate the performance of such system management tasks as software installation and configuration, device configuration and management, problem determination, and storage management. SMIT features both a character-based curses interface and an AIXwindows-based graphical user interface.
- Automatic Input/Output device configuration.
- Support for ASCII terminals to serve as the system console.
- Support for remote installation from a system on a local area network (LAN).
- Extensive problem determination facilities, including the following:
 - A set of menu-driven hardware problem determination facilities
 - Consolidated and enhanced trace and dump support
 - Enhanced error messages.
- Accounting services.

Communications Facilities

AIX for RISC System/6000 provides the following communications facilities:

- Network File System (NFS) support compatible with Open Network Computing (ONC)/NFS Version 4.0 developed by Sun Microsystems, Inc. NFS includes Network Information Service (NIS) support, Network Lock Manager, remote mapped files support, the Remote Procedure Call (RPC) API, and eXternal Data Representation (XDR). NFS uses TCP/IP to communicate on an Ethernet Version 2, IEEE 802.3, or Token-Ring local area network (LAN).
- High Availability for Network File System (HANFS), which provides enhanced availability for data accessed using the Network File System (NFS). A RISC System/6000 system running AIX and HANFS can maintain data availability during planned outages and certain types of hardware, software, and media failures.
- Network Computing System (NCS) support, which provides transparent access capabilities for end users, developers, and applications. NCS uses TCP/IP to communicate on an Ethernet Version 2, IEEE 802.3, or Token-Ring LAN.
- Portable STREAMS Environment (PSE), which is a flexible I/O subsystem well-suited for protocol-based inter- and intrasystem communication. PSE includes end-user commands, the Transport Layer Interface (TLI) library, the loadable STREAMS environment and application programming interface, drivers for communication through the Internet protocols (TCP and UDP), UNIX-domain protocols, and an Ethernet-based Data Link Provider Interface (DLPI). PSE is upwardly compatible with OSF/1.0 and is compatible with the AT&T Base System V Release 4 STREAMS environment.
- Support for AT&T Base System V Release 4 compatible streams.
- Transmission Control Protocol/Internet Protocol (TCP/IP) facilities, including end-user commands, network security support, and an application programming interface. TCP/IP can communicate on an Ethernet Version 2, IEEE 802.3, or Token-Ring LAN; an X.25 wide area network (WAN); an asynchronous connection (using Serial Line Interface Protocol); or a Serial Optical Channel. TCP/IP can also communicate through an S/370 block multiplexer channel connection, ESCON connection, or a Fiber Distributed Data Interface (FDDI) LAN. Simple Network Management Protocol (SNMP) Agent support is

included with TCP/IP, as well as with SNMP Management Information Base. The SNMP agent supports the sending of SNMP trap information to a designated SNMP manager.

AIX for RISC System/6000 TCP/IP implementation is based on 4.3 BSD-Reno and includes the following:

- Adherence to Internet protocols as described in *X/OPEN Guide to Internet Protocol Suites*
 - Support for Internet Engineering Task Force Request for Change (RFC) 1105, 1122, 1123, 1155, 1156, 1157, and 1158. RFC 1122 and 1123 support does not include function that would affect connectivity of UNIX-based systems running TCP/IP.
 - Conformance to Defense Communications Agency Military Standards 1777, 1778, 1780, 1781, and 1782.
- DOS Server, which allows users and applications on appropriately attached IBM PCs and PS/2s running the IBM AIX Access for DOS Users licensed program to access files and printers and to run AIX programs on the RISC System/6000 host. DOS Server can communicate on an IEEE 802.3 or Token-Ring LAN or an asynchronous connection.
 - Basic Networking Utilities (BNU/UUCP), which provides for remote system polling, remote system login, remote command execution, job queuing, and file transfer between AIX for RISC System/6000 and other UNIX systems with BNU facilities installed. BNU can use TCP/IP to communicate on an Ethernet Version 2, IEEE 802.3, or Token-Ring LAN, an X.25 WAN, an asynchronous connection, or a Serial Optical Channel. BNU can also use TCP/IP to communicate through an S/370 block multiplexer channel connection, ESCON connection or a Fiber Distributed Data Interface (FDDI) LAN.
 - Mail Facilities, including the 4.3 BSD-Reno sendmail application and the Rand Corporation Message Handler (MH) application, which allow users to generate, process, send, and receive messages across a network. Mail Facilities use TCP/IP to communicate on an Ethernet Version 2, IEEE 802.3, or Token-Ring LAN, an X.25 WAN, an asynchronous connection, or a Serial Optical Channel. Mail Facilities can also use TCP/IP to communicate through a S/370 block multiplexer channel connection, ESCON connection or a Fiber Distributed Data Interface (FDDI) LAN. Mail Facilities can also use BNU to communicate on an asynchronous connection.
 - Ethernet Version 2 and IEEE 802.3 LAN support, which requires the IBM Ethernet High-Performance LAN Adapter.
 - IBM Token-Ring LAN support, which requires the IBM Token-Ring High-Performance Network Adapter.
 - X.25 WAN support, including supplied user applications, an application programming interface, and support for using higher-level protocols (including SNA and TCP/IP) over an X.25 wide area network. Communications on an X.25 WAN require the IBM X.25 Interface Co-Processor/2. RISC System/6000 software does not offer packet assembly and de-assembly (PAD) support for asynchronous terminals. If you would like to use asynchronous terminals with the X.25 Interface Co-Processor/2, contact your network company for PAD equipment.
 - Synchronous Data Link Control (SDLC) WAN support, which requires the IBM 4-Port Multiprotocol Communications Controller, or the single port Multiprotocol Adapter/A.
 - Asynchronous communications support, including asynchronous terminal emulation (ATE). The two standard EIA-232D ports in the RISC System/6000 system unit, as well as the following adapters, support asynchronous communications:
 - IBM 8-Port Async Adapter - EIA-232
 - IBM 8-Port Async Adapter - EIA422A
 - IBM 8-Port Async Adapter - MIL-STD 188

- IBM 16-Port Async Adapter - EIA -232
- IBM 16-Port Async Adapter - EIA-422A
- IBM 128-Port Async Controller with IBM Remote Async Nodes.
- Serial Optical Channel Converter (SOCC) support, which can provide point-to-point connectivity between RISC System/6000 system units, or connection to a heterogeneous network through use of a router from the Network Systems Corporation (NSC) Data Exchange (DX) series.
- Fiber Distributed Data Interface (FDDI) support, which, with appropriate hardware, can allow RISC System/6000 system units to participate in single- and dual-ring FDDI LANs.
- IBM System/370 Block Multiplexer Channel support, which can, with appropriate hardware, allow connection to a System/370 block multiplex channel.
- IBM System 390 ESCON Channel support, which can, with appropriate hardware, allow ESCON connections to the ES/9000 and ES/3090J family of processors.

For more information about communications facilities and connectivity to other systems, see Chapter 3. "Communications Connectivity Overview" for more information.

Documentation

The extensive online library of RISC System/6000 documentation is designed to be used with the InfoExplorer information retrieval software, a hypertext retrieval system included with AIX for RISC System/6000. The InfoExplorer software provides an online documentation interface that contains full hypertext search and retrieval facilities, as well as multiple task-oriented and reference-oriented navigation and retrieval aids. The software supports both ASCII and windows-based interfaces.

Hardcopy documentation of the operating system, as well as other RISC System/6000 software and hardware, is also available. For more information on available softcopy and hardcopy books please refer to the *AIX/6000 Version 3.2 and RISC System/6000 Documentation Overview* (SC23-2456).

Other Facilities

AIX for RISC System/6000 provides the following additional features:

- Enhanced printer spooler facilities
- Text Formatting System, which includes **nroff**, **troff**, **tbl**, **neqn**, **eqn**, **mm**, **pic**, and **vgrind**.

IBM AIXwindows Environment/6000 Licensed Program

AIXwindows Environment/6000 1.2.5 is a state-of-the-art windowing system providing support for the X Windows Release 5 (X11R5) windowing/services for AIX Version 3.2.5 for RISC System/6000. AIXwindows Environment/6000 Version 1.2.5 is binary compatible with X Windows Release 4 (X11R4).

The IBM AIXwindows Environment/6000 licensed program is a collection of graphical user interfaces that provides the ability to develop and run advanced graphics applications, enhanced X-Windows applications, and AIXwindows applications.

AIXwindows Environment/6000 contains the following:

- AIXwindows, a graphical user interface that is based on the OSF/MOTIF offering from the Open Software Foundation (OSF). AIXwindows has a user interface tool kit (libXm.a), a Window Manager (mwm), and a user interface language (uil) for developing and using AIXwindows applications.
- AIXwindows Desktop, a graphical user interface that provides the user with an iconic view of the AIX file system and allows the user to manipulate the file system through icons. For example, by manipulating icons the user can browse the AIX file system, create and delete files, and perform other simple file maintenance tasks.
- Enhanced X-Windows, an enhanced version of the X Window System Version 11, Release 4 by Massachusetts Institute of Technology (MIT). Enhanced X-Windows contains language bindings for C and FORTRAN programs.
- Graphics Library (GL), a high-function graphical interface library for the application programmer. GL is compatible with the GL interface of Silicon Graphics Incorporated.
- Enhanced X-Windows Display PostScript, which allows applications to output Display PostScript to a window. The Display PostScript Interpreter provides an interactive, display-oriented environment that is independent of the window system. In addition it provides a single-image model for both display and printer data streams.

AIXwindows Environment/6000 Version 1.2.5 (X11R5) adds the following new functions:

- Support for POWER GXT100 or POWER GXT150 adapters.
- Terminal Emulation, Xterm, the terminal emulator from Massachusetts Institute of Technology (MIT) consortium is supported.
- X Windows Color Management, Xcms provides color management support
- ISO fonts, additional fonts complying with International Organization of Standards (ISO) 9241 Part 3 standards are provided (applies to X11R4 and X11R5).
- Display PostScript Level 2, DPS Level 2 unifies and extends the PostScript language by incorporating several PostScript language enhancements.
- Enhancements to the crosshair cursor and multicolor cursor are included.
- Screen Saver extension added.

AIXwindows/3D Feature enhancements in AIXwindows Environment/6000 Version 1.2.5:

- Softgraphics, Full software implementation allowing full function 3D graphics capability to POWERstations with 2D graphics adapters.
 - PEXlib 5.1 and graPHIGS (X11R4 and X11R5) allow full function 3D graphics capability on all current graphics adapters, as well as the new POWER GXT100 or POWER GXT150 graphics adapters.
 - OpenGL 1.0 (X11R5 only) provides an easy-to-use, full featured, network transparent API for developing 3D applications. It supports most current graphics adapters, as well as the POWER GXT100 or POWER GXT150 graphics adapters.

- PEXlib 5.1 Enhancements (X11R4 and X11R5). The PEX server provides X Logical Font Description (XLFD) font naming support, and IBM is supplying PEXlib on-line documentation using the InfoExplorer interface.
- graPHIGS Enhancements (X11R4 and X11R5). Unicode Character Set and graPHIGS Image Workstation type including Adobe PostScript output support.

Software Considerations

AIXwindows Environment/6000 is designed to execute on the IBM RISC System/6000 POWERstations and POWERservers with AIX for RISC System/6000.

To support the Xstation 120, 130, 140, 150, POWER GXT100, or POWER GXT150, the following software is required:

- A RISC System/6000 host server with AIX Version 3.2.5 for RISC System/6000 and AIXwindows Environment/6000 Version 1.2.5
- IBM AIX Xstation Manager/6000 (5601-457) running on the host server.

To support a System/370 or 390 attachment to AIXwindows Environment/6000 on a LAN, the IBM AIX/ESA Operating System (5756-112) is required.

Hardware Considerations

AIXwindows Environment/6000 is designed to execute on all IBM RISC System/6000 POWERstations and POWERservers configured with a minimum of 16MB of system memory, using a graphics display and the associated graphics adapter:

AIXwindows Environment/6000 also supports the following:

- Tablets
- Mouse
- Dials
- Lighted program function keyboard
- Graphics adapters.

IBM AIXwindows Interface Composer/6000, Version 1.2 Licensed Program

The AIXwindows Interface Composer/6000 Version 1.2 licensed program is a graphical user interface (GUI) development tool that provides assistance to the software developer in the design and development of GUIs for applications using OSF/Motif 1.2. The developer directly manipulates user interface components, such as buttons and panels, to lay out the GUI. This results in the automatic generation of the C code for the user interface. In addition, the developer can link in code and test the behavior of the interface through a built-in C interpreter. AIXwindows Interface Composer/6000 Version 1.2 provides full multibyte character support and C++ code-generation capability. (AIXwindows Interface Composer/6000 Version 1.1.1 will continue to be available for ordering by customers using OSF/Motif 1.1)

The AIXwindows Interface Composer/6000 Version 1.2 includes the following features:

- Ability to define the layout, determine the behavior, and test the GUI.
- Automatic generation of C code for the GUI.
- Motif 1.2 support, with access to all OSF/Motif 1.2 widgets, gadgets, and properties.
- C++ code-generation facility.
- Support for custom widgets.
- Color icon support.
- Support for reusable interface components.
- Full multibyte character support.
- Increased integration with Workbench/6000 CASE Environment.
- Builder Engine packaging to allow customized versions of AIC.
- Widget Palette user interface for enhanced usability.
- UIL code-generation capability.
- Enhanced documentation.

Software Considerations

AIXwindows Interface Composer/6000 Version 1.2 executes on AIXwindows Environment/6000 Version 1.2.4 running on AIX Version 3.2.4 for RISC System/6000.

Hardware Considerations

AIXwindows Interface Composer/6000 Version 1.2 is designed to execute on all RISC System/6000 POWERstations and POWERservers configured with a minimum of 16MB of system memory, using graphics adapters supported by AIXwindows Environment/6000 Version 1.2.

AIXwindows Interface Composer/6000 Version 1.2 requires 22MB free direct-access storage device (DASD) to complete its installation and a minimum of 16MB of random access memory (RAM). Total RAM and DASD requirements for the machine are based on all licensed programs and user applications to be installed.

Note: For 160MB systems, the AIXwindows development environment cannot be installed on the internal fixed disk due to space limitations. The AIXwindows Environment/6000 Version 1.2 code can be downloaded through a host RISC System/6000.

IBM AIX/6000 Professional Graphics Tool Collection Licensed Programs

The AIX/6000 Professional Graphics Tool Collection features three licensed programs that support an application development environment and end-user interfaces.

IBM AIX Computer Graphics Interface Toolkit/6000 Licensed Program

AIX Computer Graphics Interface Toolkit/6000 is a set of graphics primitives that can be called from various RISC System/6000 programming languages and used to create device-independent graphics code. The AIX Computer Graphics Interface Toolkit/6000 provides virtual device interfaces and the Computer Graphics Interface (CGI) for application programming.

AIX Computer Graphics Interface Toolkit/6000 provides a migration path for applications developed using the IBM RT System Graphics Development Toolkit. The AIX Computer Graphics Interface Toolkit/6000 includes the following features:

- Support for AIXwindows through the Xlib routines in the AIXwindows Environment/6000 licensed program
- Support for hardcopy and metafile capture
- Event mode notification (asynchronous interrupt when input data is available)
- Support for input from dials, tablet devices, or lighted programmable function keyboards.

IBM AIX Graphics File Translator/6000 Licensed Program

AIX Graphics File Translator/6000 provides an interactive tool and an application programming interface (API). The tool allows CGM-formatted files to be viewed, combined, or output to a printer or plotter.

The API provides functions to interpret or to translate the metafile elements of a CGM-formatted file.

Graphics File Translator (GFT) supports C, FORTRAN, and Pascal language bindings. GFT output can be directed to Enhanced X-Windows, hardcopy devices, or captured as revisable data file images (metafiles).

The translator features the following:

- Support for ANSI CGM X3.122-1986 Standard
- Encoding capabilities:
 - Binary Record Format
 - Clear Text Record Format
 - Character-Encoding Record Format
- Building blocks for chart creation.

IBM AIX Graphics Plotting System/6000 Licensed Program

AIX Graphics Plotting System allows data to be output directly to Enhanced X-Windows or to hardcopy devices such as printers and plotters. Data can also be captured as a revisable data file image (metafile) in the AIX Graphics File Translator/6000 CGM format. C, FORTRAN, and Pascal language bindings are available.

The plotting system features the following:

- Support for ANSI CGM X3.122-1986 Standard
- Building blocks for chart creation.

Tool Collection Software Considerations

AIX/6000 Professional Graphics Tool Collection requires AIX for RISC System/6000 on the RISC System/6000 system. Additionally, for a user to write programs using the tool collection, one of the following compilers must be installed:

- IBM AIX XL C Compiler/6000 (part of the AIX for RISC System/6000 licensed program)
- IBM AIX XL FORTRAN Compiler/6000 licensed program
- IBM AIX XL Pascal Compiler/6000 licensed program.

To use the Enhanced X-Windows system driver with the tool collection, the IBM AIXwindows Environment/6000 licensed program must be installed.

Tool Collection Hardware Considerations

When running applications using the Enhanced X-Windows device driver, the AIX/6000 Professional Graphics Tool Collection has the same hardware considerations as the AIXwindows Environment/6000.

IBM AIX InfoCrafter/6000 Licensed Program

IBM AIX InfoCrafter/6000 offers a solution for the online authorship and management of large libraries of information. It can enhance internal information management, and allow application developers to provide comprehensive online documentation for their software products.

An online library can be virtually any size and can be segmented into as many as 15 separate information bases, allowing for a greater degree of modularity.

AIX InfoCrafter/6000 includes a set of tools that provides a batch-oriented "build" process for compiling online libraries read by the InfoExplorer information retrieval software. A license extension, which allows users to view non-IBM documentation through the InfoExplorer software, is required. The extension is a separately orderable option available with AIX for RISC System/6000.

Information can be cross-linked using a variety of hypertext links, such as links from text to text, links from text to art, or links from text to system files. Information bases can also include tables, online help text for applications, multiple fonts, and illustrations.

Authors can create navigation documents designed specifically to assist users with information retrieval.

AIX InfoCrafter/6000 permits the following environments:

Authoring

- Interleaf Version 5 (vector graphics)
- FrameMaker 3.0 Environment
- ASCII.

Graphics Formats

- Interleaf Version 5 (vector graphics)
- Computer Graphics Metafile (CGM) (vector graphics)
- Tagged Image File Format (TIFF), Class B/CCITT (bitmap/raster graphics).

Software Considerations

AIX InfoCrafter/6000 requires AIX for RISC System/6000 and the InfoExplorer License Extension for each workstation that will read non-IBM libraries. The InfoExplorer software is part of AIX for RISC System/6000.

IBM AIX XL FORTRAN Compiler/6000 Version 2 Licensed Program

The AIX XL FORTRAN Compiler/6000 is an application enabler for the RISC System/6000 family of products. This licensed program includes the AIX XL FORTRAN Run Time Environment/6000.

The AIX XL FORTRAN Compiler/6000 provides the following features:

- Meets American National Standard FORTRAN Programming Language, (ANSI X3.9-1978), ISO 1539-1980(E), and Federal Information Processing Standard (FIPS) publication 69 industry standards
- Partial implementation of the ISO and ANSI FORTRAN 90 Standard
- Implements the FORTRAN interface of the SAA Common Programming Interface in the AIX for RISC System/6000 environment
- Source code compatible, with some exceptions, with:
 - IBM VS FORTRAN
 - IBM RT PC FORTRAN 77
 - IBM AIX/RT VS FORTRAN
 - IBM AIX/RT XL FORTRAN (except as noted in the *User's Guide for IBM AIX XL FORTRAN Compiler/6000*, SC09-1354)
- Highly optimized object code, under option control
- Compiler functionality enhancements:
 - Pointer support for dynamic storage allocation and dynamic equivalence
 - Extended precision floating point (16 bytes)
 - Support for byte data type
 - Under option control, support for integers in logical expressions and logicals in arithmetic expression
 - f77 compiler invocation command
- Compiler option for promotion of floating-point items
- Compiler option for detection of floating-point exceptions
- Support for TMPDIR environment variable for scratch file placement
- Support for optimizing preprocessor
- Support for AIX linkage conventions
- Support for ANSI/IEEE standard 754-1985 for binary floating-point arithmetic
- Support for inter-language calls, including *value* parameter passing
- Support for the trace back table and indices
- Input/Output and Math Library support
- Support for dynamic linking of FORTRAN programs
- Support for the **dbx** and **xde** symbolic debugging tools.

Software Considerations

The AIX XL FORTRAN Compiler/6000 requires AIX for RISC System/6000 on the RISC System/6000 system.

IBM AIX XL Fortran Compiler/6000 Version 3 Licensed Program

The AIX XL Fortran Compiler/6000 is an application enabler for the RISC System/6000 family of products. This program provides all the functions of existing XL FORTRAN Compiler/6000 Version 2 with additional performance enhancements and the full implementation of Fortran 90 language standard.

The XL Fortran Compiler/6000 supports the following standards:

- ISO Programming Language Fortran, ISO/IEC 1539:1991
- ANSI Programming Language Fortran 90: ANSI X3.198-1992
- ANSI X3.9-1978
- FIPS PUB 69-1, FORTRAN
- ANSI/IEEE Standard 754-1985 for Binary Floating-Point Arithmetic
- Some extensions described in the US Military Standard, a supplement to ANSI FORTRAN 77
- IBM SAA FORTRAN standard, providing compatibility across IBM platforms

In addition to the functions of the XL FORTRAN Compiler/6000 Version 2, this program also provides the following enhancements:

- Language Extensions Support:
 - 64-bit integers and logicals
 - INTSIZE and REALSIZE compiler options to set default sizes of data types
 - Additional intrinsic functions such as the Cray conditional vector merge functions
- Key Fortran 90 features:
 - Array Operations: Simplify code with operations on whole arrays and array sections
 - Derived Types: Create your own data types from intrinsic data types
 - Dynamic Memory Allocation: Allocate and deallocate memory for allocatable arrays and pointer targets at run time. Create linked lists and code using pointers and derived types
 - Modules: Define and group together data, procedures, and interfaces that can be accessed from any program unit.
- Other Fortran 90 features:
 - Pointers
 - CASE construct
 - Named DO and IF constructs
 - EXIT and CYCLE statements for DO constructs
 - Free form source
 - Attribute specification in type declaration statements
 - Optional and keyword arguments
 - Intent of dummy arguments
 - Interface blocks
 - Internal procedures
 - Recursive procedures
 - Defined assignment and defined operators
 - Nonadvancing input/output
 - New intrinsic procedures

Software Considerations

The AIX XL Fortran Compiler/6000 Version 3 requires AIX for RISC System/6000 Version 3.2.5 on the RISC System/6000 system.

The KAP and VAST optimizing preprocessors are now separately licensed products instead of integrated with the compiler.

Hardware Considerations

The XL Fortran Compiler/6000 Version 3 will run on RISC System/6000 POWERstations and POWERservers configured with at least one supported display and keyboard or one ASCII terminal. The following is also required:

- RISC System/6000 with a minimum of 16MB of random access memory (RAM)
- 13.4MB of DASD for the licensed program materials.

IBM AIX XL FORTRAN Run Time Environment/6000 Licensed Program

Applications developed using the AIX XL FORTRAN Compiler/6000 must be linked with AIX XL FORTRAN Run Time Environment/6000 for execution. The Run Time Environment can be linked using dynamic binding (requiring that the Run Time Environment be available at the time the application is executed). Alternatively, the Run Time Environment can be statically linked to the application, resulting in a larger object module, but eliminating the need for the Run Time Environment in the execution environment.

This licensed program is included with the AIX XL FORTRAN Compiler/6000, or can be purchased separately.

The Run Time Environment provides the following features:

- Meets American National Standard FORTRAN Programming Language, (ANSI X3.9-1978), ISO 1539-1980(E), and Federal Information Processing Standard publication 69 industry standards
- Input/Output and Math Library support.

Software Considerations

The AIX XL FORTRAN Run Time Environment/6000 requires AIX for RISC System/6000 on the RISC System/6000 system.

IBM AIX XL Pascal Compiler/6000 Version 1 Licensed Program

The AIX XL Pascal Compiler/6000 generates optimized object code when the optimization compiler option is specified. The function of AIX XL Pascal Run Time Environment/6000 comes with the compiler.

The AIX XL Pascal Compiler/6000 Version 1 provides the following features:

- Meets American National Standard Pascal Computer Programming Language (ANSI/IEEE 770X3.97-1983), ISO 7185-1983(0), and Federal Information Processing Standard publication 109 industry standards
- Source-code compatible, with some exceptions, with System/370 VS Pascal (exceptions are noted in the *User's Guide for IBM AIX XL Pascal Compiler/6000*, SC09-1326)
- Support for ANSI/IEEE standard 754-1985 for binary floating-point arithmetic
- Support for interlanguage calls
- Support for the **dbx** symbolic debugging tool
- A library of run-time routines that support input and output operations, string manipulation operations, and other language-specific operations.

Software Considerations

The AIX XL Pascal Compiler/6000 requires AIX for RISC System/6000 on the RISC System/6000 system.

IBM AIX XL Pascal Compiler/6000 Version 2 Licensed Program

The AIX XL Pascal Compiler/6000 generates optimized object code when the optimization compiler option is specified. The function of AIX XL Pascal Run Time Environment/6000 comes with the compiler.

The AIX XL Pascal Compiler/6000 Version 2 provides the following features:

- Meets American National Standard Pascal Computer Programming Language (ANSI/IEEE 770X3.97-1983), ISO 7185-1983(0), and Federal Information Processing Standard publication 109 industry standards
- Source-code compatible, with some exceptions, with System/370 VS Pascal (exceptions are noted in the *User's Guide for IBM AIX XL Pascal Compiler/6000 Version 2*, SC09-1756)
- Support for ANSI/IEEE standard 754-1985 for binary floating-point arithmetic
- Support for interlanguage calls
- Support for the **dbx** symbolic debugging tool
- A library of run-time routines that support input and output operations, string manipulation operations, and other language-specific operations.

Software Considerations

The AIX XL Pascal Compiler/6000 requires AIX for RISC System/6000 Version 3.2.5 on the RISC System/6000 system.

IBM AIX XL Pascal Run Time Environment/6000 Licensed Program

Applications developed using the AIX XL Pascal Compiler/6000 must be linked with AIX XL Pascal Run Time Environment/6000 for execution. The Run Time Environment can be linked using dynamic binding (requiring that the Run Time Environment be available at the time the application is executed). Alternatively, the Run Time Environment can be statically linked to the application, resulting in a larger object module, but eliminating the need for the Run Time Environment in the execution environment.

The function of the AIX XL Pascal Run Time Environment/6000 is included with the AIX XL Pascal Compiler/6000, or it can be purchased separately.

The AIX XL Pascal Run Time Environment/6000 library routines include support for the following types of functions that can be invoked by an AIX XL Pascal Compiler/6000 program:

- Text file data transformations between the character form found in text files and the internal data formats
- Data file access and support functions
- String manipulation functions.

Software Considerations

AIX XL Pascal Run Time Environment/6000 requires AIX for RISC System/6000 on the RISC System/6000 system unit.

IBM AIX VS COBOL Compiler/6000 Licensed Program

Note: Available only in AP countries.

The AIX VS COBOL Compiler/6000 is a compiler that contains a Micro Focus-developed front end and an IBM-developed native code generator. The compiler aids the development and maintenance of COBOL applications targeted for compilation and execution on IBM System/370 host mainframes in the VM/CMS and MVS operating environments. The function of the AIX VS COBOL Run Time Environment/6000 comes with the compiler.

The AIX VS COBOL Compiler/6000 provides the following features:

- Designed to comply with the following industry standards:
 - ANSI X3.23–1985, ISO 1989–1985 (High Level)
 - ANSI X3.23–1974 (High Level)
 - Federal Information Processing Standard (FIPS) publication 21–2–COBOL
- Conformance to the IBM SAA COBOL CPI
- Source-code compatible, with some exceptions, with the languages supported by the following compilers (exceptions are noted in the *VS COBOL Language Reference*, SC23-2177):
 - IBM AIX PS/2 VS COBOL
 - IBM AIX/RT VS COBOL
 - IBM Personal Computer COBOL Compiler, Version 1.00
 - IBM COBOL Version 2.00
 - IBM COBOL/2
- The following language syntax variants are supported:
 - A subset of IBM VS COBOL II
 - A subset of IBM OS/VS COBOL
 - IBM Personal Computer COBOL Compiler, Version 1.00, and IBM COBOL Version 2.00 with minor restrictions
 - IBM COBOL/2
 - Micro Focus extensions for the IBM Personal Computer
 - SAA COBOL CPI with double-byte character set (DBCS) support (see *SAA COBOL CPI*, SC26-4354)
- Animator debugging facilities
- FORMS-2 forms generator
- Support for AIX linkage conventions
- Support for C-ISAM files
- Support for the XCOFF object module format
- Support for the **dbx** symbolic debugging tool
- Keyboard and screen input/output configuration utilities
- A COBOL run-time library
- A variable length file handler package
- Invocation utilities.

The AIX VS COBOL Compiler/6000 does not contain any floating-point arithmetic facilities.

The compiler allows COBOL programs to run by being interpreted, dynamically loaded, or statically linked.

Software Considerations

The AIX VS COBOL Compiler/6000 requires AIX for RISC System/6000 on the RISC System/6000 system.

IBM AIX VS COBOL Run Time Environment/6000 Licensed Program

Note: Available only in AP countries.

AIX VS COBOL Run Time Environment/6000 contains the necessary COBOL components to execute applications developed with the AIX VS COBOL Compiler/6000 on another system.

AIX VS COBOL Run Time Environment/6000 is included with the AIX VS COBOL Compiler/6000. It can also be purchased separately.

Software Considerations

AIX VS COBOL Run Time Environment/6000 requires AIX for RISC System/6000 on the RISC System/6000 system.

IBM AIX Ada/6000 Licensed Program

The AIX Ada/6000 Compiler is a production-quality compiler, suitable for either large- or small-scale software projects. The function of the IBM AIX Ada Run Time Environment/6000 comes with the compiler.

The compiler provides the following features:

- Validation at the level 1.11 of the Ada Compiler Validation Capability (ACVC) test suite
- Meets American National Standard Ada ANSI/MIL-STD 1815A-1983, ISO 8652-1987, and Federal Information Processing Standard (FIPS) publication 119 industry standards
- Conformance to the declarations in the package specification of the Proposed Standard for a Generic Package of Elementary Functions in Ada ISO-IEC/JTC1/SC22/WG9 (Ada) Numerics Rapporteur Group, Draft 1.2, dated 8/21/90
- Ada library management tools
- Symbolic debugger with graphics and ASCII interfaces
- Pragma interface to FORTRAN, C, and RISC System/6000 Assembler
- AIXwindows (Xlib) interface
- Graphics Library (GL) interface
- Global optimizer
- Code profiler
- Source dependency analyzer:
 - Cross-referencer
 - Syntax verifier
 - Source code formatter
 - Recompilation tools.

Software Considerations

AIX Ada/6000 requires AIX for RISC System/6000 on the RISC System/6000 system. Applications that are compiled with dynamic binding require that the Ada/6000 or the Ada Run Time Environment/6000 be present at the time the application is executed. Applications that are compiled with static binding do not require the Ada/6000 or the Ada Run Time Environment/6000 in the execution environment.

IBM AIX Ada Run Time Environment/6000 Licensed Program

The AIX Ada Run Time Environment/6000 contains the necessary Ada components to execute dynamically bound applications developed with the IBM AIX Ada/6000 Compiler on another system.

The function of the AIX Ada Run Time Environment/6000 is included with the AIX Ada/6000 Compiler, or it can be purchased separately.

Software Considerations

AIX Ada Run Time Environment/6000 requires AIX for RISC System/6000 on the RISC System/6000 system.

IBM AIX XL C++ Compiler/6000 Licensed Program

The IBM AIX XL C++ Compiler/6000 offers a productive application development environment for programmers and application developers. C++ is an object-oriented programming language that also offers all the capabilities of the C language, allowing the user to start from a familiar base and migrate to C++.

The IBM AIX XL C++ Compiler/6000 is a native optimizing compiler which supports templates and exception handling. The compiler is based on the 1992 working paper of ANSI Programming Language C++.

The IBM AIX XL C++ Compiler/6000 includes the following tools:

- UNIX System Laboratory Standard C++ Class libraries: Iostream, task, and complex.
- C++ Browser is a post-compilation static analysis tool based on client/server architecture that allows the user to view relationships between objects.
- Test coverage analyzer which allows users to diagnose coverage of their test suites.

Software Considerations

The IBM AIX XL C++ Compiler/6000 requires the following:

- AIX for RISC System/6000 on the RISC System/6000 system
- AIXWindows Environment/6000 (for the browser tool only).

Hardware Considerations

AIX XL C++ Compiler/6000 is designed to run on RISC System/6000 POWERstations and POWERservers configured with at least one supported display and keyboard or one ASCII terminal. The following is also required:

- RISC System/6000 with a minimum of 16MB of random access memory (RAM)
- 13MB of DASD for Licensed Program Materials
- Additional 19MB of DASD for InterViews and NIH example class.

The following are required for the browser tool:

- Graphics Display. One of the following:
 - Color: IBM 5081 Model 016, IBM 6091 Models 019 and 023
 - IBM 8508 Monochrome Display
 - IBM 8507 Monochrome Display
- Mouse.

IBM C Set ++ for AIX/6000 Version 2

The IBM C Set ++ for AIX is a licensed program product designed to offer a productive application development environment for C and C++ programmers and application developers.

IBM C Set ++ for AIX allows users to target their applications to execute on a specific processor architecture (POWER, POWER2, or PowerPC) for optimal performance, or to target their applications to execute on all IBM RISC/6000 processors for compatibility.

IBM C Set ++ for AIX is a follow-on version of the IBM XL C++ Compiler program product (5765-035). C Set ++ for AIX includes:

- **C compiler**
The C compiler component of C Set ++ for AIX is upwardly source code compatible with XL C Compiler 1.2.1 and supports the following standards:
 - ANSI/ISO-IEC 9899-1990/1992
 - ISO/IEC 9899:1990(E)
 - FIPS 160 COther enhanced features include:
 - Supports pre-tokenized header files
 - Supports interprocedural analysis with profiling feedback
 - Supports development tools (ie. Browser, HeapView debugger, and Test coverage analyzer)
- **C++ compiler**
The C++ compiler component of C Set ++ for AIX is upwardly source code compatible with XL C++ Compiler/6000 Version 1 and is based on the 1992 working paper of the American National Standards Institute (ANSI) Programming Language C++. It supports both templates and exception handling. It also supports interprocedural analysis with profiling feedback for C++ application.
- **HeapView Debugger** which allows users to detect, debug and optimize dynamic memory usage of their C and C++ programs.
- **Test Coverage Tool** which allows users to diagnose performance problems, to design and verify coverage of their test suites.
- **The following C++ Class libraries are provided:**
 - UNIX System Laboratories (USL) standard class libraries, iostream, task, and complex.
 - Collection Class Library which uses data abstraction to implement a wide variety of classical data structures (for example queue, deque, stack, binary tree, set...).
 - Application Support Class Library consists of support classes such as string, date, time and exception.
 - C++ Class Library Example - InverViews 3.1.

Software Considerations

The C Set ++ for AIX requires the following:

- AIX for RISC System/6000 Version 3.2.5 on the RISC System/6000 system.
- AIXWindows Environment/6000 (for the Browser and debugger tool).

Hardware Considerations

The C Set ++ for AIX is designed to run on the RISC System/6000 POWERstation and POWERservers configured with at least one supported display and keyboard or one ASCII terminal. The following are also required:

- RISC System/6000 with minimum of 16MB of random access memory (RAM).
- 36MB of DASD for the Licensed Program Materials.
- Additional 17MB of DASD for InterViews Class Library.

The following are required for the Browser tool:

- Graphic Display. One of the following:
 - Color: IBM 5081 Model 016, IBM 6091 Models 019 and 023,
 - IBM 8508 Monochrome Display.
 - IBM 8507 Monochrome Display.
- Mouse

IBM AIX System Network Architecture Services/6000 Licensed Program

AIX System Network Architecture Services/6000 allows user-provided application programs to communicate with traditional 3270, remote job entry (RJE), and peer applications within a Systems Network Architecture (SNA) network. AIX SNA Services/6000 provides application programming interfaces, including Common Programming Interface for Communications (CPI-C) to SNA Logical Unit (LU) 0, 1, 2, 3, and 6.2 protocols.

AIX SNA Services/6000 allows an application program to:

- Connect to IBM host applications using synchronous data link control (SDLC) or a Token-Ring LAN:
 - Communicate with Customer Information Control System (CICS) applications (LU 6.2)
- Connect to nonhost (peer) products with LU 6.2:
 - Other RISC System/6000 systems (using X.25, SDLC, or an Ethernet or Token-Ring LAN)
 - IBM AS/400 (using SDLC or a Token-Ring LAN)
 - IBM Personal System/2 (using SDLC or an Ethernet, IEEE 802.3, or Token-Ring LAN)
 - IBM Personal Computers (using SDLC or a Token-Ring LAN).

AIX SNA Services/6000 contains the following additional features:

- Support for Physical Unit (PU) type 2.1
- Support for SNA Security
- Menu-based user interfaces that aid in network configuration and security
- Support for System Services Control Point-Physical Unit (SSCP-PU) sessions for transmission of network management alerts.

Software Considerations

AIX SNA Services/6000 requires AIX for RISC System/6000 on the RISC System/6000 system.

Hardware Considerations

AIX SNA Services/6000 requires one of the following adapters on the RISC System/6000 system:

- IBM Token-Ring High-Performance Network Adapter, with appropriate cables to attach to an IBM Token-Ring LAN
- IBM Ethernet High-Performance LAN Adapter, with appropriate cables to attach to an Ethernet or IEEE 802.3 LAN
- IBM X.25 Interface Co-Processor/2, with appropriate cables to attach to an X.25 packet-switching network
- IBM 4-Port Multiprotocol Communications Controller and 4-Port Multiprotocol Interface Cable, with appropriate cables to attach to a modem to establish an SDLC connection to an IBM System/370 or a supported peer workstation.

IBM AIX 3270 Host Connection Program/6000 Licensed Program

The AIX 3270 Host Connection Program/6000 allows RISC System/6000 users and applications to interact with an IBM System/370 or IBM System/390 through a 3270 display or printer emulation session. The program enables RISC System/6000 displays, ASCII workstations, and IBM Xstations to emulate Models 2, 3, 4, and 5 of the IBM 3278/79 Display Stations. AIX National Languages are supported.

The AIX 3270 Host Connection Program/6000 provides the following features:

- 3278/79 display emulation support.
- 3286/87 background printer emulation support.
- Multiple concurrent protocol support:
 - Coaxial connection (Distributed Function Terminal (DFT) and 5088/6098 Graphics Control Unit)
 - TCP/IP over Ethernet, IEEE 802.3, and FDDI Token-Ring LANs; X.25 and SDLC WANs. It can also support channel connections such as Block Multiplexer Channel, and ES Connection Architecture (ESCON)
 - SNA T2.1 connections over IEEE 802.3 and Token-Ring LANs and X.25 and SDLC WANs. LUs 1, 2, and 3 are supported.
- Multiple sessions support within a virtual terminal, across virtual terminals, and within Enhanced X-Windows:
 - A maximum of five sessions are supported through a DFT connection.
 - The number of TCP/IP sessions depends on system resource.
 - A maximum of 16 sessions are supported through a 5088/6098 Graphics Control Unit connection.
 - A maximum of 253 sessions per SNA Type 2.1 connection to a host. LU pooling capability facilitates resource management.
- Multiple hosts support.
- HLLAPI support for C, COBOL, and FORTRAN.
- File transfer support with C, Pascal, and FORTRAN programming interfaces.
- Automatic login and logoff support.
- Extended data stream support including support for seven colors, plus reverse video, underlining, or blinking. The actual attributes displayed depend on the capabilities of the display being used.
- An application programming interface (API) that allows a RISC System/6000 API to operate in the following modes:
 - Workstation application to host application communication
 - Workstation application control of emulation session

This API supports the XL C, XL FORTRAN, and XL Pascal programming languages on the RISC System/6000 system.
- Centralized utility session support for frequently used utilities, such as color and keyboard redefinition, automated session login and logoff, file transfer, and generation of session login/logoff scripts.

The AIX 3270 Host Connection Program/6000 does *not* support the following 3270 features and functions for display emulation:

- Magnetic reader control and accessories
- Monocase switch
- Selector light pen
- Video output
- APL/text character set
- Programmed symbols
- Alternate cursor
- Cursor blink
- 3270 diagnostic dump
- Explicit partitions
- Numeric lock
- Attachment to Port 0 of an IBM 3174 or 3274 Subsystem Control Unit
- Response time monitor for an IBM 3174 or 3274 Subsystem Control Unit
- 3174 Subsystem Control Unit print
- For printer emulation:
 - Color
 - APL language characters
 - Programmed symbols
 - 3287 printer operation switches (PA1, PA2, Cancel Operations).

Software Considerations

AIX 3270 Host Connection Program/6000 requires AIX for RISC System/6000 on the RISC System/6000 system. It also requires AIX SNA Services/6000 for SNA Type 2.1 connections.

The S/370 or S/390, operating in a VM/CMS, MVS/TSO, or CICS/VS environment, must have one of the following installed to support file transfer:

- VM/CMS 3270-PC File Transfer Program (IND\$FILE), 5664-281
- MVS/TSO 3270-PC File Transfer Program (IND\$FILE), 5665-311
- CICS/VS 3270-PC File Transfer Program, 5798-DQH.

In a VSE/SP or VSE/ESA environment, the File Transfer Program is included with the host's base operating system.

Hardware Considerations

AIX 3270 Host Connection Program/6000 requires one of the following adapters on the RISC System/6000 system:

- IBM 3270 Connection Adapter, with appropriate cables to attach to an IBM 3174 or IBM 3274 Control Unit, an IBM 4361 Work Station Adapter, or an IBM 9370 Work Station Subsystem Controller configured in Distributed Function Terminal (DFT) mode. For SNA DFT mode, AIX SNA Services/6000 is not required.
- IBM System/370 Host Interface Adapter with appropriate cables to attach to an IBM 5088 or 6098 Graphics Control Unit.
- IBM X.25 Interface Co-Processor/2, with appropriate cables to attach to an X.25 packet-switching network.*
- IBM single-port Multiprotocol Adapter/A (MCA).
- IBM 4-Port Multiprotocol Communications Controller, 4-Port Multiprotocol Interface Cable, and appropriate cables for modem attachment.*

- IBM Token-Ring High-Performance Network Adapter (support for both 4 Mbps and 16 Mbps), with appropriate cables to attach to an IBM Token-Ring LAN.*
- IBM Ethernet High-Performance LAN Adapter, with appropriate cables to attach to an Ethernet or IEEE 802.3 LAN.
- IBM FDDI adapter.
- IBM Block Multiplexer Channel Adapter.
- IBM ES Connection Architecture (ESCON) Channel Adapter.

*For SNA Type 2.1 connections, use of this adapter requires installation of AIX SNA Services/6000.

The following ASCII terminals are supported: IBM 3151, IBM 3161, IBM 3162, IBM 3163, IBM 3164, DEC VT 100, DEC VT 220, WYSE WY-50, and WYSE WY-60. 3278/79 Model 2 emulation is available on all ASCII terminals; Model 5 emulation is available on ASCII terminals that can be configured with a screen size of 28 by 132. Other ASCII terminals can be supported if the user provides appropriate configuration information.

IBM AIX 3278/79 Emulation/6000 Licensed Program

AIX 3278/79 Emulation/6000 allows RISC System/6000 users and applications to interact with an IBM System/370 through a 3278 or 3279 terminal emulation session. AIX 3278/79 Emulation/6000 also allows file transfer capabilities, including conversion between IBM EBCDIC and IBM RISC System/6000 ASCII character sets.

With AIX 3278/79 Emulation/6000 both the host-controlled 3270 session and the AIX operating system can be active at the same time. AIX 3278/79 Emulation/6000 supports one active host session only.

AIX 3278/79 Emulation/6000 includes the following features:

- Emulation support for a subset of the functions available on the IBM 3278 Model 2 and IBM 3279 Models 2A and S2A display stations
- Support for screen print and save functions
- Support for customization of color definitions and keyboard layout.

The AIX 3278/79 Emulation/6000 program does *not* support the following 3270 features and functions:

- Security key lock
- Magnetic reader control and accessories
- Monocase switch
- Selector light pen
- Video output
- APL/text character set
- Programmed symbols
- Alternate cursor
- Cursor blink
- Explicit partitions
- Numeric lock
- Double-byte character set.

Software Considerations

AIX 3278/79 Emulation/6000 requires AIX for RISC System/6000 on the RISC System/6000 system.

AIX 3278/79 Emulation/6000 requires that the host system be operating in an IBM VM/CMS or IBM MVS/TSO environment.

The IBM System/370 IND\$FILE program must be installed on the host system to support file transfer.

Hardware Considerations

AIX 3278/79 Emulation/6000 requires the IBM 3270 Connection Adapter on the RISC System/6000 system. Appropriate cables must attach this adapter to an IBM 3174 or 3274 Control Unit configured for control unit terminal (CUT) mode.

NetWare for AIX/6000 from IBM Licensed Program

NetWare for AIX/6000 from IBM Version 3.11 brings the resources and applications of AIX to personal computer local area network (LAN) users. It combines the services of NetWare with the AIX/6000 Operating System and provides file and print sharing among DOS, Windows, and OS/2 NetWare clients and AIX/6000 users.

Based on NetWare for UNIX (formerly Portable NetWare) from Novell, Incorporated, NetWare for AIX/6000 from IBM brings the open environment of UNIX to NetWare users.

NetWare for AIX/6000 from IBM integrates the heterogeneous computing environments of DOS, Windows, OS/2, and AIX.

NetWare for AIX/6000 from IBM is compatible with other NetWare implementations as certified by Novell.

NetWare for AIX/6000 from IBM features the following:

- Integrates RISC System/6000 systems into existing NetWare personal computer LANs
- Transparent to existing NetWare clients
- Preserves existing PC desktop environment and adds access to AIX/6000
- Common file and print resources shared by personal computer and AIX/6000 environments
- Open AIX/6000 server
- Support for IPX/SPX protocols in AIX/6000
- Personal Computer access to AIX/6000 applications via Novell Virtual Terminal
- DOS or OS/2 supported as personal computer NetWare clients.

Software Considerations

NetWare for AIX/6000 from IBM requires AIX Version 3.2 for RISC System/6000 on the RISC System/6000 system.

Hardware Considerations

NetWare for AIX/6000 from IBM is designed for RISC System/6000 POWERstations and POWERservers configured with at least one supported display with keyboard and mouse, or one ASCII terminal and one of the following IBM communications adapters:

- Token-Ring High-Performance Network Adapter
- Ethernet High-Performance LAN Adapter.

A minimum of 30MB of fixed-disk storage is required to load the server, and 60MB is recommended.

IBM AIX Open Systems Interconnection Messaging and Filing/6000 Licensed Program

IBM AIX Open Systems Interconnection Messaging and Filing/6000 (OSIMF/6000) provides AIX for RISC System/6000 users with electronic mail (MHS) and file transfer (FTAM) services that support the Open System Interconnection (OSI) standards specified by the International Organization for Standardization (ISO).

AIX OSIMF/6000 allows AIX for RISC System/6000 to communicate with other OSI systems through OSI connections over ISO 8802/3 CSMA/CD, ISO 8802/5 Token-Ring, or X.25 networks. It also provides bidirectional application gateways to the mail (SMTP) and filing (FTP) services of the Transmission Control Protocol/Internet Protocol (TCP/IP) program that may coexist on the same RISC System/6000 system.

AIX OSIMF/6000 and TCP/IP applications can operate concurrently and share the RISC System/6000 communications adapters.

Software Considerations

AIX OSIMF/6000 requires AIX for RISC System/6000 on the RISC System/6000 system.

AIX OSIMF/6000 will not be supported by AIX Version 3.2 for RISC System/6000 until a service upgrade has been installed. Check with your marketing representative for availability of this service upgrade.

Hardware Considerations

AIX OSIMF/6000 requires one of the following adapters on the RISC System/6000 system:

- IBM Token-Ring High-Performance Network Adapter, with appropriate cables to attach to an IBM Token-Ring LAN
- IBM Ethernet High-Performance LAN Adapter, with appropriate cables to attach to an IEEE 802.3 LAN
- IBM X.25 Interface Co-Processor/2, with appropriate cables to attach to an X.25 packet-switching network.

IBM AIX AS/400 Connection Program/6000 Licensed Program

IBM AIX AS/400 Connection Program/6000 allows a RISC System/6000 user to communicate with an IBM AS/400 system. Operating under System Network Architecture (SNA) or Transmission Control Protocol/Internet Protocol (TCP/IP), it allows a RISC System/6000 system to access applications and data residing on an AS/400.

Under SNA, the AS/400 Connection Program/6000 provides 5250 emulation capability, file transfer facilities, and remote command function. The file and data transfer function operates similarly to that in IBM AS/400 PC Support. Under TCP/IP it provides 5250 emulation capability. Japanese Language support is also provided.

Software Considerations

AS/400 Connection Program/6000 requires AIX for RISC System/6000 on the RISC System/6000 system.

Hardware Considerations

AS/400 Connection Program/6000 requires one of the following adapters on the RISC System/6000:

- IBM Token-Ring High-Performance Network Adapter, with appropriate cables to attach to an IBM Token-Ring LAN
- IBM Ethernet High-Performance LAN Adapter, with appropriate cables to attach to an Ethernet or IEEE 802.3 LAN
- IBM 4-Port Multiprotocol Communications Controller, 4-Port Multiprotocol Interface Cable, and appropriate cables for modem attachment.

If you are using a Token-Ring connection, the AS/400 system requires one of the following:

- IBM 16/4 Mbps Token-Ring Network Attachment (feature code 2636) for 9402 system unit
- IBM Token-Ring Network Adapter (feature code 6160 or 2636) for 9404 system unit
- IBM Token-Ring Network Adapter (feature code 6240 or 6242) for 9406 system unit.

The following displays and ASCII terminals are also supported on the RISC System/6000:

- IBM 5081, Models 16 and 19
- IBM 6091, Models 19 and 23
- IBM 8508, Model 19
- IBM 3151
- IBM 3161
- IBM 3162
- IBM 3163
- DEC VT220
- WYSE Wy-50.

For more information on communicating with an AS/400, see Chapter 3. "Communications Connectivity Overview".

IBM AIX Personal Computer Simulator/6000 Licensed Program

The AIX PC Simulator/6000 runs many IBM Personal Computer DOS, Versions 3.30 or 4.0, application programs without modification on the RISC System/6000 system. The AIX PC Simulator/6000 can run one or more DOS programs concurrently in multiple windows and on multiple displays. The simulator can work at the console and at nonconsole terminals. Multiple simulator sessions can access common files.

The AIX PC Simulator/6000 includes the following features:

- Real mode Intel 80286/80287 processor support is simulated
- Support for the floating-point instructions of the Intel 80287 processor
- Lotus-Intel-Microsoft (LIM) 4.0 support for windowing into C000 and D000 memory segments
- Support for program execution and load from directory drives
- Diskette support (through the BIOS interface only)
- Support for DOS files to be maintained as AIX files, thus enabling DOS and AIX applications to share data.

The AIX PC Simulator/6000 does *not* support the following functions:

- Dedication of Micro Channel adapters to AIX PC Simulator/6000
- Direct access to the RISC System/6000 diskette controller or the Direct Memory Access (DMA) chip.

Furthermore, the AIX PC Simulator/6000 may not be able to run DOS programs that contain hardware or timing dependencies.

Software Considerations

AIX PC Simulator/6000 requires the AIX for RISC System/6000 on the RISC System/6000 system. To run PC AT application programs, IBM DOS, Versions 3.30 or 4.0, is also required. Some features also require AIXwindows Environment/6000 licensed program.

Hardware Considerations

Some PC AT application programs using the AIX PC Simulator/6000 may have special hardware requirements.

IBM AIX Access for DOS Users Licensed Program

IBM AIX Access for DOS Users Version 3.1 (AADU 3.1) provides transparent access for personal computer users to the AIX RISC System/6000 file system and allows AIX applications to be executed on the RISC System/6000 computer through keyboard emulation. This latest version includes Microsoft Windows 3.1 integration, DOS Version 5.0 enablement, and support for Network Driver Interface Specification (NDIS) drivers.

IBM AIX Access for DOS Users Version 3.1 allows DOS users to share the AIX file system of the host RISC System/6000 in a manner that requires no UNIX operating system knowledge by the user and provides access to system printers attached to the RISC System/6000 POWERserver.

IBM AIX Access for DOS Users Version 3.1 replaces IBM AIX Access for DOS Users Version 2.1.

Software Considerations

The following software must be installed on the personal computer to run IBM AIX Access for DOS Users Version 3.1:

- DOS Version 5.0 or subsequent releases

The RISC System/6000 POWERserver must have AIX Version 3.2 (or later modification levels) with the DOS Server function installed. In addition, it must have the appropriate network communications support installed.

The user will experience limited support for character translation from AIX to DOS and from DOS to AIX, if running IBM AIX Access for DOS Users Version 3.1 through a host that is running the DOS Server component of AIX Version 3.2 for RISC System/6000. AIX operating systems cannot create file names that include DOS graphics characters (such as double-line characters). Creating such characters will result in error messages.

The functionality of DOS **BACKUP** and **RESTORE** commands may be reduced on the virtual drive.

To use the DOS **CHCP** command on the virtual drive, the DOS **NLSFUNC** command must be installed as described in the DOS manual. Additionally, **COUNTRY.SYS** must be installed on the local drive.

The following DOS commands should not be used on the virtual drive because unpredictable results may occur:

- **ASSIGN**
- **FDISK**
- **FORMAT**
- **PRINT**
- **SYS**
- **BACKUP**
- **RESTORE**
- **JOIN**
- **TREE**
- **SHARE**

Versions of IBM DOS that utilize print spooling should not be used with virtual drives.

Hardware Considerations

IBM AIX Access for DOS Users Version 3.1 is designed to execute with the following minimum configuration:

- IBM Personal Computer, Personal Computer XT, Personal Computer AT, and Personal System/2 (PS/2)
- Minimum 512KB of random access memory
- 950KB of disk storage space
- A communications adapter or one of the following network interface boards:
 - IBM Token-Ring Network Adapters 16MB and 4 MB
 - 3COM EtherLink (3C501)
 - 3COM EtherLink II (3C503)
 - 3COM Etherlink/MC (3C523)
 - DEC DEPCA Series
 - SMC (Western Digital) WD8003/8013
 - Ungermann-Bass NIC (ISA)
 - Ungermann-Bass NIC (MCA)
 - XIRCOM Pocket Adapter.

IBM AIX Xstation Manager/6000 Licensed Program

AIX Xstation Manager/6000 supports the attachment of IBM Xstations to a RISC System/6000 system on an Ethernet Version 2, IEEE 802.3, or IBM Token-Ring LAN. An Xstation 130 can run both Ethernet and Token-Ring sessions concurrently. AIX Xstation Manager/6000 allows the Xstations to use host-based applications using X Window System Version 11 Release 3, Version 11 Release 4 (Xstation Manager 1.3), or X Window System Version 11 Release 5 (Xstation Manager 1.4).

The program includes:

- Downloadable software for the X Window System and TCP/IP.
- A facility that allows users to select the desired host at the login screen.
- A facility to allow remote printing on printers and plotters attached to the Xstation.
- System Management Interface Tool (SMIT) support. SMIT can be used to add Xstations to the network and to set user parameters.
- X Display Manger Control Protocol (XDMCP) Support.
- Simple Network Management Protocol (SNMP) Support (Xstation Manager 1.4).
- X Window System Version 11 Release 5 Font Server capability (Xstation Manager 1.4).

The AIX Xstation Manager/6000 downloads X Server software to the Xstation. This software is designed to allow applications running on hosts to open windows. The RISC System/6000 system or other systems on the LAN that support X Window System Version 11 Release 3 or Release 4, or Release 5 can serve as clients to the Xstation.

Software Considerations

AIX Xstation Manager/6000 requires AIX for RISC System/6000. The TCP/IP component of AIX for RISC System/6000 must be installed and configured on the RISC System/6000 system. AIXwindows Environment/6000 must also be installed on the RISC System/6000 system.

If AIX Xstation Manager/6000 is to be used with other systems on the LAN, the other systems must have the following software installed:

System	Required Software
RISC System/6000	
	IBM AIX Version 3 for RISC System/6000
	IBM AIXwindows Environment/6000
	TCP/IP component of AIX for RISC System/6000
Other	
	Operating System
	X Window System
	TCP/IP

Hardware Considerations

For an Ethernet Version 2 or IEEE 802.3 connection, the RISC System/6000 system requires the IBM Ethernet High-Performance LAN Adapter. The Xstation 130 comes standard with one Ethernet Version 2/IEEE 802.3 port.

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For a Token-Ring connection, the RISC System/6000 system requires the IBM Token-Ring High-Performance Network Adapter. The Xstation 130 requires the IBM Token-Ring Network 16/4 Adapter/A.

The Xstation 150 has a selectable option for Ethernet/IEEE 802.3 or Token-Ring adapters.

IBM AIX DirectTalk/6000 Licensed Program

IBM AIX DirectTalk/6000 allows a caller direct access to information on different applications and processing environments. The caller drives the transaction, eliminating the need for a person to translate the request, which can increase a business' productivity and competitive advantage. The 24-hour access that DirectTalk/6000 provides can also improve customer satisfaction.

DirectTalk/6000 is a licensed program component of the IBM CallPath DirectTalk Voice Processing System, a high-performance voice processing system capable of providing voice response and messaging functions for large-volume call applications.

DirectTalk/6000 is programmed and administered using a graphics-oriented user interface with windowing and help screen capabilities. Programming is accomplished using a high-level application-specific scripting language.

The IBM 9291 Digital Trunk Processor or the IBM 9295 Multiple Digital Trunk Processor provides T1 and CEPT digital telephony connectivity to customer premises on central office switching equipment. For information on these devices, see "Digital Trunk Processors" on page 1-106.

DirectTalk/6000 communicates with IBM hosts primarily through 3270 emulation. Other forms of data connectivity are supported through the use of a custom server. The custom server provides an open architecture that facilitates the development of a variety of inbound and outbound applications. The program is designed to support 12 to 71 T1 or 12 to 90 CEPT telephone lines in a single system.

Software Considerations

IBM AIX DirectTalk/6000 requires the following on the RISC System/6000 system:

- AIX for RISC System/6000
- AIXwindows Environment/6000
- AIX Network Management/6000
- AIX SNA Services/6000.

Hardware Considerations

For 3270 host access, IBM AIX DirectTalk/6000 requires one of the following adapters on the RISC System/6000:

- IBM 4-Port Multiprotocol Communications Controller and 4-Port Multiprotocol Interface Cable, with appropriate cables to attach to a modem to establish an SDLC connection to a host
- IBM Token-Ring High-Performance Network Adapter, with appropriate cables to attach to an IBM Token-Ring LAN.

IBM AIX Distributed Computing Environment/6000 Licensed Programs

IBM AIX Distributed Computing Environment (DCE) is the foundation for distributed computing in an open systems environment. AIX DCE is a comprehensive suite of integrated, modular products that support transparent communications and resource sharing. This suite of products is designed to give customers the ability to design and implement distributed applications that will run in heterogeneous, networked computing environments. These products are based on the Open Software Foundation Distributed Computing Environment Version 1.0.2, an integrated set of the industry leading distributed computing technologies.

The AIX DCE suite of products include AIX DCE Base Services/6000, AIX DCE Cell Directory Server/6000, AIX DCE Security Server/6000, AIX DCE Threads/6000, AIX DCE Enhanced Distributed File System/6000, AIX DCE Global Directory Server/6000, and AIX DCE Global Directory Client/6000. AIX Encina Base is an optionally orderable feature of AIX DCE Base/6000.

The DCE administrative domain is called a cell, which is a combination of client and server workstations. This domain is defined by the user. A minimum DCE cell requires the installation of one DCE cell directory server, one DCE security server, and some number of DCE clients (workstations with the DCE Base installed). Because the servers also request services, DCE Base must be installed on every server workstation.

AIX DCE Base feature of AIX DCE Base Services/6000. includes the following:

- DCE Cell Directory client, which can be used to locate remote services in the DCE Cell.
- The Security Services "client" in the form of run-time library routines. In addition, a security client daemon, used to verify the identity of the Security Server, and several security client utility programs are provided.
- Time service, both client and server, which provides each workstation on the network with a synchronized time standard. This service provides a single time reference for an application that is distributed over several workstations and enables it to properly schedule activities and to determine sequencing and duration.
- Administrative tools that allow any machine in the network to perform as an administrative console. Some of the typical functions include configuring a cell, adding or deleting users from a cell, and adding servers to a cell.
- DCE threads is a user-level threads library based on the Pthreads interface specified in the POSIX 1003.4a standard (Draft 4). It is a mandatory component of the DCE implementation and is provided for operating systems that do not provide threads services.
- Optionally installable tools, such as an NIDL-to-IDL conversion program and the IDL compiler.

AIX DCE Cell Directory Server/6000. is a separate licensed program that provides a central repository for information about resources in a DCE cell which can be retrieved from anywhere within the cell. Typical resources are machines and RPC-based services. The Cell Directory Manager manages a database of information containing names and attributes of resources.

AIX DCE Security Server/6000. is a separate licensed program that enables secure communications and controlled access to resources. It provides a set of security-related functions including authentication, authorization, and user account management.

AIX DCE Threads/6000. is a separate licensed program that allows multiple sequential flows of execution within a single process. In a client-server environment, Threads allows servers to handle multiple client requests simultaneously. They also allow clients to make multiple requests simultaneously, thus providing improved service availability in a distributed environment.

AIX DCE Enhanced Distributed File System/6000. is a log-based physical file system that is integrated into the operating system kernel. It can be accessed both as a local file system when individual file sets are mounted, and as a remote file system when file sets are exported from the file server machine or workstation into the DCE uniform file space.

AIX DCE Global Directory Server/6000. is a distributed, replicated database service. The database consists of a hierarchical set of names, the namespace, with certain attributes. Given a name, its associated attributes can be looked up in the GDS Server. For example, given the name of a print server, the Global Directory Server can return the printer's location. The Global Directory Server gives distributed-system users a central place to store information, which can be retrieved from anywhere in the distributed system. The server provides presentation and session layers to run over Open System Interconnect (OSI) protocols and transport as well as network layers to run over TCP/IP protocols. This release of the server has been tested and supports TCP/IP protocols.

Global directory client and server can be used in AIX DCE and non-DCE environments.

AIX DCE Global Directory Client/6000. provides a user-level pthreads library that conforms to POSIX 1003.4 Draft 4a and a set of administration tools to manage the directory database. Also provided, the X/Open XDS/XOM application programming interface enables applications to access either the cell directory or the global directory by means of a common application programming interface.

Global directory client and server can be used in AIX DCE and non-DCE environments.

Software Considerations

IBM AIX DCE products are designed to execute under AIX Version 3.2.4 for RISC System/6000 (5756-030) or a later release.

HACMP/6000 is not a supported environment.

Hardware Considerations

IBM AIX DCE products are designed to run on RISC System/6000 POWERstations and POWERservers configured with a minimum of one supported display with keyboard and mouse, or one supported ASCII terminal, and a minimum of 16MB of memory.

IBM Encina for AIX/6000 Licensed Programs

The Encina family is a suite of five modular products that allow customers to design, develop, test, and implement distributed transaction processing applications.

The Encina Base feature of AIX DCE Base Services/6000 provides a distributed two-phase commit protocol and other transaction services for applications in an AIX Distributed Computing Environment.

The following is a description of the Encina servers and some of their uses:

Encina Server for AIX/6000. provides recovery, locking, and logging services for workstations that run transactional application servers.

Encina Structured File Server for AIX/6000. provides support for indexed sequential storage of data.

Encina Monitor for AIX/6000. adds development, execution, and administration services to the capabilities of the Encina Server for AIX/6000.

Encina Peer-to-Peer Executive for AIX/6000. contains the APIs for LU6.2 peer-to-peer communication as well as an emulation of LU6.2 over TCP/IP. The Executive provides library routines that can be used with Transactional-C or C. These routines support the SAA Common Programming Interface-Communications (CPI-C) and CCA Common Programming Interface-Resource Recovery (CPI-RR) interfaces. The Executive supports X/Open's peer-to-peer API standard.

Encina Peer-to-Peer Gateway for AIX/6000. is used to convert the client portion of the Encina presumed abort protocol to the presumed nothing protocol used by AIX System Network Architecture/6000 Version 1.2.

Software Considerations

The Encina products require AIX Version 3.2.4 for RISC System/6000 or a later release. The following programs are also prerequisites:

- AIX Encina Base, a feature of AIX DCE Base Services/6000, must be installed on every workstation in the cell.
- AIX DCE Base, a feature of AIX DCE Base Services/6000, must be installed on every workstation in the cell.
- One instance of AIX DCE Security Server/6000 must be installed in the cell.
- One instance of AIX DCE Cell Directory Server/6000 must be installed in the cell.

In addition, the Encina products have the following requirements:

- At least one instance of the Encina Server for AIX/6000 must be installed in the cell.
- The Encina Server for AIX/6000 must be installed on every application server that accesses X/Open-compliant databases.
- If the Encina Monitor for AIX/6000 is installed, one instance of the Encina Structured File Server for AIX/6000 must be installed in the cell.
- The Encina Monitor for AIX/6000 must be installed on every server containing resources managed by the monitor.
- If the CICS/6000 Monitor is installed, one instance of the Encina Structured File Server for AIX/6000 must be installed in the cell.

- The Encina Peer-to-Peer Executive/6000 must be installed on every workstation running an application that is communicating in a peer-to-peer style (for example, using the CPI-C/RR interface) with another application on a different workstation.
- The Encina Peer-to-Peer Gateway/6000 can be installed on a designated machine in the cell to connect to SNA networks. The Encina Peer-to-Peer Executive/6000 is a prerequisite on the gateway node.

Performance may be affected by the total system memory available, the amount of fixed-storage available, and type/performance of the disk drives. Performance may also be affected by the type and function of the applications selected and running at the same time.

Hardware Considerations

These products are designed to execute on RISC System/6000 POWERstations and POWERservers configured with at least one supported display with keyboard and mouse, or one supported ASCII terminal and a minimum of 16MB of memory. Minimum machine requirements may be affected by the application workload distribution, total system memory, and page space available.

IBM AIX High Availability Cluster Multi-Processing/6000 (HACMP/6000) Licensed Program

The AIX High Availability Cluster Multi-Processing/6000 (HACMP/6000) Version 2.1 is designed to bring cluster processing and high availability functions to the open systems environment.

HACMP/6000:

- Manages systems for high availability control and fallover (automatic recovery/restart for applications either designed for the cluster processing environment or configured in loosely coupled processors) from hardware system failures in mission-critical database and OLTP (online transaction processing)
- Provides utilities for high availability no-single-point-of-failure function in an HACMP/6000 server configuration
- Supports, through the cluster concept, two-way horizontal scalability with shared disk systems
- Provides through Concurrent Cluster Volume and Lock Management, 4-way node clusters in both the IBM 9333 High-Performance Disk Drive Subsystem and the IBM 7135-110 RAIDiant Array
- Provides shared backup recovery/restart for business-critical applications over and above independent configurations.

Software Considerations

The AIX High Availability Cluster Multi-Processing/6000 (HACMP/6000) version 2.1 requires the AIX Version 3.2.4 for RISC System/6000 or a later release. Each processor within a high availability server complex requires the licensed program AIX High Availability Cluster Multi-Processing/6000 Version 2.1 to be installed. All processors in the HACMP/6000 server complex should be at the same level of the AIX operating system including PTFs and maintenance upgrades.

Hardware Considerations

AIX High Availability Cluster Multi-Processing/6000 Version 2.1 is designed to execute with RISC System/6000 processors in a “no-single-point-of-failure” server configuration. HACMP/6000 Version 2.1 will support the RISC System/6000 models which are designed for server application and meet the minimum requirement for internal memory, internal disk, and I/O slots. RISC System/6000 models and their corresponding upgrades are supported in HACMP/6000 Version 2.1.

The POWERserver 300 series (7012) and POWERserver 500 series (7013) can be paired in any combination. The POWERserver 500 series (7013) and POWERserver 900 series (7015) can be paired in any combination. However, some models and some configurations have not been specifically tested or are not considered viable solutions. For example:

- The POWER server 7015 (900 series models) should not be coupled with POWERserver 7012 (300 series models) or POWERserver 7011 (200 series models).
- The POWERserver 7013 (500 series models) should not be coupled with POWERserver 7011 (200 series models).
- Any model produced specifically for client or high-performance workstation use should not be used as an HACMP/6000 Version 2.1 server.

Note: The IBM 7011 and 7012 POWERstation and POWERserver models 220, 22W, 23S, 25S, 320, 32H, and 32E can also be used in the HACMP/6000 server configuration, but due to slot limitations, a single-point-of-failure is unavoidable in the shared disk resources.

Actual configuration requirements are highly localized, according to the required function and performance needs of individual sites. In configuring a cluster, particular attention must be paid to:

- Fixed-disk capacity and mirroring (LVM and Database)
- Slot limitations and their effect on creating a single-point-of-failure
- Client access to the cluster
- Other LAN devices (routers, bridges) and their effect on the cluster
- The replication of I/O adapters
- The replication of power supplies
- Other network software.

Whenever a process takes over resources after a failure, consideration must be given to work partitioning. For example, if processor A is expected to take over for failed processor B and continue to perform its original duties, A must be configured with enough resources to perform the work of both.

IBM UniTree for AIX/6000 Licensed Program

UniTree for AIX/6000 introduces a new concept in storage management for the open systems environment, offering a hierarchical file and storage management system for AIX Version 3.2 for RISC System/6000 workstations and servers. UniTree provides continuous, nonintrusive, multilevel, transparent file and data storage management. Guided by parameters specified by customers, UniTree migrates infrequently used files from expensive disk storage to lower-cost storage while maintaining frequently used files online and ready for use.

Designed to operate on either a single RISC System/6000 POWERstation or POWERserver or a cluster of RISC System/6000 POWERstations and POWERservers running under High Availability Cluster Multi-Processing/6000 (HACMP/6000), the UniTree hierarchical manager optimizes the use of storage devices by automatically and transparently migrating files between peripheral storage devices. This reduces the use of more expensive, higher-performance storage in favor of less expensive magnetic tape or optical storage devices. Moreover, UniTree minimizes end-user involvement in the management of data files, increasing user productivity by automating many data archiving and retrieval functions.

Software Considerations

UniTree for AIX/6000 is designed to run under AIX Version 3.2 for RISC System/6000 or a later release. UniTree also operates with HACMP/6000. A separate license is required for each designated machine on which the licensed program materials will be used.

When UniTree functions as a single logical file server on a HACMP/6000, only one license is required. In the configuration, UniTree may partition itself so that part of its code executes on one processor while the rest of its code executes on another processor.

Only one copy of the program may be installed per RISC System/6000 workstation or cluster of workstations (under HACMP/6000).

Hardware Considerations

UniTree for AIX/6000 can be installed on the following RISC System/6000 machine types:

- 7012 (Model 320H and higher)
- 7013
- 7015.

UniTree requires a minimum of 16MB internal memory, 400MB internal disk storage (or internal RAID storage). UniTree supports the following storage devices:

- IBM 7208 8-mm External Tape Drive
- IGM-ATL 8-mm (Automated Tape Library)
- Comtec ATL-8 Model 54 (Automated Tape Library)
- DocuStore family of Automated Libraries
- IBM 9333 High-Performance Disk Drive Subsystem
- Maximum Strategy RAID Storage Server (RAID-3)
- Storage Concepts Concept 550 Series RAID storage system
- Storage Concepts Concept 51-S Series RAID storage system
- EXABYTE EXB-10i CHS (Cartridge Handling System)
- EXABYTE EXB-120 CHS (Cartridge Handling System)
- StorageTek 4400 Automated Cartridge System
- StorageTek 4781/4780 Cartridge Subsystem
- Hewlett Packard Optical Disk Library Systems
- Alphatronix Inspire Rewritable Optical Jukebox

UniTree supports the following LAN adapters:

- Token-Ring High-Performance Network Adapter
- Ethernet High-Performance LAN Adapter or integrated Ethernet adapter for applicable machines
- Fiber Distributed Data Interface (FDDI) Adapter and FDDI Dual-Ring Upgrade Kit

IBM AIX Performance Toolbox/6000 and IBM AIX Performance Aide/6000

AIX Performance Toolbox/6000 (PTX/6000) and AIX Performance Aide/6000 (PAIDE/6000) operate in concert with earlier performance tools, and provide new and improved ways of monitoring, analyzing, and tuning the performance of an IBM RISC System/6000.

PTX/6000 consists of several performance programs packaged together. It provides a toolbox framework for performance management tools that can be used on a single system or in a local area network (LAN) environment. This facility can augment the information gathered from a higher level network monitor such as AIX NetView/6000. The PTX/6000 monitors can provide a finer granularity live view into individual network nodes and processes. It is an X-Motif based application that provides live color graphic performance monitors for local and remote systems, performance analysis tools, and performance tuning controls. It also includes the programs in the PAIDE/6000.

PAIDE/6000 is used as the primary provider of local AIX performance statistics. It has facilities for concurrently servicing multiple data requests from local or remote applications. It can do local data filtering and alert processing. Additionally, it can provide data to an SNMP agent.

Software Considerations

IBM AIX Performance Toolbox/6000 and IBM AIX Performance Aide/6000 are designed to execute under the following:

- AIX Version 3.2.3 for RISC System/6000 (5756-030) or a later release. Selective enhancements for AIX Version 3.2 and 3.2 are required to support PTX/6000 and PAIDE/6000.
- AIXwindows Environment/6000 Version 1.2 and Enhanced X-Windows.
- AIX TCP/IP.

Hardware Considerations

IBM AIX Performance Toolbox/6000 and IBM AIX Performance Aide/6000 are designed to run on RISC System/6000 POWERstations.

IBM AIX Ultimedia Services/6000

AIX Ultimedia Services/6000 (Ultimedia Services) is an installable extension to the base AIX operating system that supports the use of audio and video data on RISC System/6000 workstations including the RISC System/6000 POWERstation and POWERserver models.

The Ultimedia Services extensions provide a robust programming interface to promote the development, enablement or migration of multimedia applications to AIX. Callable multimedia objects, created using IBM's System Object Model (SOM), add audio and video capability within the framework of existing applications. Sample code and utilities are also provided to assist in the development of new applications.

The Ultimedia Services software uses the Multimedia-Audio Capture and Playback Adapter (M-ACPA) for CD quality sound support.

The Audio Editor allows you to edit, play, and record audio data in several file and audio formats. Audio file formats include NeXT/Sun SND and RIFF WAVE. Audio data formats include 8-bit PCM, 16-bit PCM, mu-law, and A-law.

The Movie Editor allows you to play and edit movies recorded in either Ultimotion or MJPEG wrapped in a RIFF AVI file format.

Software Considerations

Ultimedia Services requires AIX 3.2.4; X11R5 and Motif 1.2 are required for using the Audio Editor and Movie Editor.

Hardware Considerations

Ultimedia Services is designed to run on RISC System/6000 POWERstation and POWERserver models configured with a minimum of one supported display, display adapter, keyboard, mouse, and M-ACPA.

IBM AIX 5080 Emulation Program/6000

The IBM AIX 5080 Emulation Program/6000 package for the RISC System/6000 family of workstations provides the interactive graphics capabilities of the 5080 Graphics System, and supports many popular System/390-based computer aided design/computer aided manufacturing (CAD/CAM) applications. The package offers expanded 5080 function connection and performance options using the RISC System/6000.

The AIX 5080 Emulation Program/6000 offers scalable performance (up to two times the 5086-01i) through a range of graphics adapters and RISC System/6000 platforms. A full range of communications options are available, including attachment to existing coaxial cable, a new coaxial cable to Transmission Control Protocol/Internet Protocol (TC/PIP) local area network (LAN) Gateway function, and support for the 6098/FDDI protocol. Multiple windowed 5080 graphics sessions are supported using the capabilities of the AIXwindows Environment. Hardware support for the 5080 input devices (Dials, lighted programmable function keyboard (LPFK), and Spaceball) is also provided. Cost-effective soft peripherals are provided to emulate the 6094 LPFK and Dials.

The AIX 5080 Emulation Program/6000 package also provides a migration option for those who use a workstation-based CAD/CAM package, while retaining access to the host-based application.

Software Considerations

IBM AIX 5080 Emulation Program/6000 is designed to run under AIX Version 3.2.2 for RISC System/6000 or a later release with AIXwindows/6000 Version 1.2.1 with 3D feature.

Hardware Considerations

The AIX 5080 Emulation Program/6000 requires any model of IBM RISC System/6000 POWERstation equipped with the following options:

- 16MB system memory minimum
- 2.2 MB minimum of hard disk space (for installation)
- A graphics adapter, processors, or system that supports the GAI/3DMI graphics subsystems such as:
 - IBM POWER GTO Graphics Processor Model 01i or 02i
 - IBM POWER Gt4i Graphics Adapter
 - IBM POWER Gt4xi Graphics Adapter 8bit/24bit
- Some examples of graphics displays supported by the above graphics adapters:
 - IBM 6091-019 (19-inch)
 - IBM 6091-023 (23-inch)
 - Any IBM POWERdisplay
- Communications adapters:
 - System/370 Host Interface Adapter (HIA)
 - Ethernet
 - Token-Ring
 - FDDI
- LPFK/Dials are supported either through the Graphics Input Device Adapter or standard serial port (on a system unit). The following devices are supported through AIXwindows:
 - IBM Three-Button Mouse

- IBM 6094-010 Dials
- IBM 6094-020 Dials
- IBM 6094-030 Spaceball
- IBM 5083 Models 021, 022 CursorPad Tablet, and 6093 Models 011, 012 Tablet

IBM AIX Distributed SMIT/6000

The Distributed System Management Interface Tool (DSMIT) provides the framework and functionality for distributed systems management. The framework provides the necessary infrastructure for such things as performing the same task on multiple machines simultaneously, performing a similar task on multiple machines simultaneously, performing distributed tasks sequentially across machines, multiplexing I/O across the managing machine and the managed machines in a network, security, and others. Functionality includes processes such as backing up files, printing files, configuring devices and other functions available through the single system SMIT.

The following DSMIT clients are available as features for this licensed program product:

- AIX DSMIT client for the IBM RISC System/6000
- SUN DSMIT client for SunOS 4.1.3
- HP DSMIT client for HP/UX 9.0.

Software Considerations

IBM AIX Distributed SMIT/6000 requires the following:

- IBM AIX Distributed SMIT/6000 is designed to run under AIX Version 3.2 for RISC System/6000 (5756-030) or a later release. (For AIX Version 3.2.3 or earlier, PTF U418283 is required prior to install.)
- TCP/IP must be installed and properly configured.
- NFS may optionally be installed and configured to distribute the DSMIT database.

DSMIT client for AIX/6000 release 3.2 or later:

- IBM AIX Distributed SMIT/6000 is designed to run under AIX Version 3.2 for RISC System/6000 (5756-030) or a later release. (For AIX Version 3.2.3 or earlier, PTF U418283 is required prior to install.)
- TCP/IP must be installed and properly configured.
- NFS may optionally be installed and configured to distribute the DSMIT database.

DSMIT client for SunOS 4.1.3:

- SunOS 4.1.3 is required.
- TCP/IP must be installed and properly configured.

DSMIT client for HP/UX 9.0:

- HP/UX 9.0 is required.
- TCP/IP must be installed and properly configured.

Hardware Considerations

IBM AIX Distributed SMIT/6000 requires:

- RISC System/6000 POWERstation or POWERserver configured with at least one supported display and keyboard
- Ethernet or Token-Ring adapter
- A minimum of 16MB random access memory
- 500KB of fixed-disk storage.

DSMIT client for AIX/6000 release 3.2 or later requires:

- RISC System/6000 POWERstation or POWERserver configured with at least one supported display and keyboard
- Ethernet or Token-Ring adapter
- A minimum of 16MB random access memory
- 300KB of fixed-disk storage is required.

DSMIT client for SunOS 4.1.3 requires:

- Sun SPARC system configured with at least one supported display and keyboard
- Ethernet or Token-Ring adapter
- 300KB of fixed-disk storage
- An additional 1MB of fixed-disk storage is required on the RISC System/6000 that is used as the DSMTP server.

DSMIT client for HP/UX 9.0 requires:

- HP Series 700 system configured with at least one supported display and keyboard
- Ethernet or Token-Ring adapter
- 300KB of fixed-disk storage
- An additional 1MB of fixed-disk storage is required on the RISC System/6000 that is used as the DSMTP server.

Security Considerations

The Distributed SMIT (DSMIT) product uses the same level of security as provided by TCP/IP **rsh** commands. Usage of DSMTP client support will subject the system to the potential risk of unauthorized access. Unauthorized systems masquerading as the DSMTP server system can access the DSMTP client system through TCP/IP commands such as **rsh** and **rlogin**.

DSMIT is not a trusted command environment because the DSMTP client must specify the DSMTP server host name in the **/.rhosts** and **/etc/hosts.equiv** file. These files maintain a listing of remote hosts that have access to the local host. Once the DSMTP server is defined in these files, the root user on the DSMTP server can execute commands on the local host (DSMIT client) without supplying a password. These files on the DSMTP client and the DSMTP server host name are sensitive since users who learn the DSMTP server host name can configure their system to masquerade as the DSMTP server. Therefore, the user management and root user must implement the necessary security procedures to protect these files from unauthorized access and to maintain the secrecy of the DSMTP server host name(s).

IBM Visualization Data Explorer Version 2

The IBM Visualization Data Explorer for RISC System/6000, a second-generation visualization application and toolkit, the means of applying analysis and advanced visualization techniques to gain insights into simulations, observations, models, and combinations of the three. The Visualization Data Explorer gives the user the unique capability to combine disparate data sets, perform correlative analysis, and to apply multiple visualization techniques in a single image.

The IBM Visualization Data Explorer includes:

- An extended graphical user interface featuring:
 - Data driven interactors
 - Data import usability
 - Module builder
 - Graphical input
 - 24-bit X Windows
- Distributed computing across multiple processors and workstations clusters
- Data type support includes:
 - 16-bit integers
 - Invalid data; for example, data drop-outs
 - Overlapping grids.

Software Considerations

The IBM Visualization Data Explorer for RISC System/6000 requires IBM AIX Version 3.2 for the RISC System/6000 and AIXwindows Environment/6000.

Hardware Considerations

The IBM Visualization Data Explorer is designed to execute on RISC System/6000 POWERstations and POWERservers.

For more information contact Thomas J. Watson Research Center/Hawthorne, P.O. Box 704, Yorktown Heights, New York 10598, or for assistance or communications through OfficeVision/VM send to YKTVMH(IBMDX).

IBM POWERbench and AIX SDE WorkBench/6000

The IBM POWERbench and AIX Software Development Environment (SDE) Workbench/6000 provide a comprehensive programming environment for C, C++, Fortran, or COBOL developers for the construction, test, and maintenance phases of software development. The set of integrated productivity programming tools includes:

- Editor
- Debugger
- Program Builder
- Static Analyzer
- Development Manager
- Tool Manager
- Integrated File Transfer
- Mail
- Help
- Configuration Management and version control support.

Each POWERbench provides an integrated software development environment for C, C++, Fortran, or COBOL developers using the traditional or object-oriented programming approach. It combines SDE WorkBench/6000 software with the C, C++, Fortran, or COBOL compilers to provide a complete programming development environment that can be customized and extended with a wide variety of integrated tools. This POWERbench/WorkBench suite of products includes:

- SDE WorkBench/6000: This product provides the common functions and services required in a typical programming environment for each POWERbench. The SDE WorkBench/6000 provides a set of services to support tool integration in a common development environment. It also comes with a set of integrated productivity tools for the construction, test, and maintenance phases of software development.
- SDE Integrator/6000: This product is a companion product used to integrate additional or existing tools that allows users to utilize SDE WorkBench/6000 services.
- C ++ POWERbench:
 - The C Set ++ POWERbench is an integrated package of SDE WorkBench/6000. IBM C Set ++ for AIX/6000 is designed for the developers who have chosen the C ++ object-oriented programming approach.
 - The compiler is a native, optimizing compiler which supports all C++ language features described in the ANSI C++ working paper.
 - The compiler can improve programmer productivity with powerful browser, HeapView debugger, useful class libraries, and global optimizer functions.
- COBOL POWERbench: This product provides a commercial application development environment for developers using the COBOL language. The POWERbench is an integrated package consisting of the following Micro Focus products integrated into IBM's SDE WorkBench/6000:
 - Micro Focus COBOL Version 3.1 for AIX
 - Micro Focus Toolbox Version 3.1 for AIX (including a copy of Operating System Extensions)
 - Micro Focus Dialog System Version 2.2 for Motif on AIX.
- Fortran POWERbench: This product integrates the SDE WorkBench/6000 Version 2 with the IBM AIX XL Fortran Compiler/6000 Version 3 which is enhanced to include Fortran 90 implementation, performance enhancements, and new language extensions.

Software Considerations

The POWERbench and AIX SDE WorkBench/6000 suite of products require AIX version 3.2 for the RISC System/6000 system and AIXwindows Environment/6000

Hardware Considerations

The POWERbench and AIX SDE WorkBench/6000 suite of products are designed to execute on the IBM RISC System/6000 family of processors.

National Language Support

IBM RISC System/6000 software provides support for the user to interact with the system using country-dependent language conventions and the native language of the user. National Language Support (NLS) varies between licensed programs and even between features within a single licensed program.

AIX for RISC System/6000 features:

- One internationalized operating system shipped worldwide
- Support for industry-standard ISO 8859 code sets and IBM Extended UNIX Code for Japanese, Korean and Taiwanese
- NLS support provided through the use of standardized utilities and functions.

The following sections describe the main national language support features and provide a generalized summary of the national language features supported by each of the licensed programs described in this document.

National Language Support Features

AIX for RISC System/6000 and many of the other IBM RISC System/6000 licensed programs provide support for national language character handling. This support is provided through IBM World Trade keyboards and printers and through functions that enable national language data handling in user-developed applications. Some licensed programs provide data "pass through" to another program.

Many of the programs support national language character usage in file names and string literals.

The international support in AIX allows applications to run in the language of the end user. Applications that use the national language support functions provided in AIX for RISC System/6000 will be enabled for the international market.

The system also supports multiple end users concurrently interacting with the system using one or more supported keyboards and respective country-dependent national language conventions.

Many messages, screens, and prompts are enabled for translation. The actual degree of translation that occurs varies between countries, licensed programs, and program functions.

101- and 102-key keyboards for Latin-1 countries (U.S., Canada, and Western Europe) are supported by IBM 850 and ISO 8859 code sets. The 102-key keyboards for Greece and Turkey are supported by ISO 8859-7 and ISO 8859-9 code sets, respectively. The 106-key keyboard is supported by Shifted-Japanese Industry Standard (S-JIS) and Extended UNIX Code-Japan (eucJP) for Kanji, Extended UNIX Code-Korea (eucKR) for Korea, and Extended UNIX Code-Taiwan (eucTW) for Taiwan.

Support is available through AIX for RISC System/6000 for the following national language keyboards:

- 101 Keys (U.S. English)
- 102 Keys (Belgium-Dutch/French)
- 102 Keys (Canadian-French)
- 102 Keys (Danish)
- 102 Keys (Finnish/Swedish)
- 102 Keys (French)
- 102 Keys (German)
- 102 Keys (Greek)
- 102 Keys (Icelandic)

- 102 Keys (Italian)
- 106 Keys (Korean)
- 102 Keys (Norwegian)
- 102 Keys (Portuguese)
- 102 Keys (Spanish)
- 102 Keys (Swiss-French/German)
- 106 Keys (Taiwanese)
- 102 Keys (Turkish)
- 102 Keys (U.K.-English)
- 106 Keys (Japan-Katakana).

National Language Support Summary

The following table gives a general description of the level of international support that is provided by each licensed program. A statement of support in this table does not imply that all features of the licensed program provide complete international support.

In the table, SB stands for single-byte character support. DB stands for double-byte character support, and refers specifically to S-JIS. MB stands for multibyte character support, and refers specifically to eucJP. Software that provides double-byte support can accommodate single-byte code sets, while software that provides multibyte support can accommodate single-, double- and multibyte code sets. Check with your RISC System/6000 marketing representative to find out which programs have messages or materials that have been translated into a particular language.

Note: In general, most licensed programs do not support national language character usage in variable names. Additionally, there are some networking and mail limitations in national language support concerning the use of international characters in names (especially in fields that belong to an architecture such as SNA). For more information, consult the technical documentation for the specific licensed program.

Licensed Program	Support for Specialized International Features				
	Character Encoding and Handling		Characters in Literals and Comments		
	SB	MB	SB	MB	
AIX for RISC System/6000	yes	yes	yes	yes	NFS and NCS are data “pass through” only. UNIX graphics have no NLS. Virtual Terminal, DOS Server, libcurses, and InfoExplorer are SB only.
AIXwindows Environment/6000	yes	yes	yes	yes	AIXwindows and Enhanced X-Windows support MBCS and the Desktop; other components in this package support DB or SB only.
AIXwindows Interface Composer/6000	yes	yes	yes	yes	
AIX/6000 Professional Graphics Tool Collection/6000: AIX Computer Graphics Interface Toolkit/6000 AIX Graphics File Translator/6000 AIXGraphics Plotting System/6000	yes	no	yes	no	Supports DB, with device driver limitations.
AIX InfoCrafter/6000	yes	no	yes	no	
AIX XL FORTRAN Compiler/6000 Version 2	yes	yes	yes	yes	MB file names for include only.
AIX XL Fortran Compiler/6000 Version 3	yes	yes	yes	yes	
AIX XL FORTRAN Run Time Environment/6000 Version 2	yes	yes	yes	yes	
AIX XL Pascal Compiler/6000 Version 1	yes	yes	yes	yes	
AIX XL Pascal Run Time Environment/6000 Version 1	yes	yes	yes	yes	
AIX XL Pascal Compiler/6000 Version 2	yes	yes	yes	yes	
AIX VS COBOL Compiler/6000	yes	no	yes	no	U.S. English date on compiler listings; DBCS names in string literals only.
AIX VS COBOL Run Time Environment/6000	yes	no	yes	no	

Licensed Program	Support for Specialized International Features				
	Character Encoding and Handling		Characters in Literals and Comments		Comments
	SB	MB	SB	MB	
AIX Ada/6000	no	no	no	no	Compiler can be used to build an NLS-enabled application.
AIX Ada Run Time Environment/6000	no	no	no	no	
C++ Compiler/6000	yes	yes	yes	yes	
C Set ++ for AIX/6000	yes	yes	yes	yes	
AIX SNA Services/6000	N/A	N/A	N/A	N/A	SB and MB are data "pass through;" no NLS names in SNA architectural fields.
AIX 3270 Host Connection Program/6000	yes	yes	N/A	N/A	
AIX 3278/79 Emulation/6000	yes	no	N/A	N/A	NLS character input restrictions using 3X74 Controller; some countries are not supported.
NetWare for AIX/6000 from IBM	no	no	no	no	
AIX Open Systems Interconnection Messaging and Filing/6000	N/A	N/A	N/A	N/A	SB and MB data is binary "pass through."
AIX AS/400 Connection Program/6000	yes	yes	N/A	N/A	MB is for Japanese Language.
AIX PC Simulator/6000	yes	no	N/A	N/A	NLS applications must be executed at the locally attached graphics display only. Some countries not supported.
AIX Xstation Manager/6000	yes	yes	yes	yes	
AIX DirectTalk/6000	yes	no	yes	no	Some countries not supported.
AIX Distributed Computing Environment	no	no	no	no	Code page support is restricted to the Open Software Foundation's DCE portable character set. The DCE portable character set is equivalent to the graphic characters in the POSIX 1003.2 Portable Character Set.
Encina for AIX/6000	yes	yes	no	no	
HACMP/6000	yes	no	yes	no	

Licensed Program	Support for Specialized International Features				
	Character Encoding and Handling		Characters in Literals and Comments		Comments
	SB	MB	SB	MB	
AIX Distributed SMIT/6000	yes	yes	yes	yes	
IBM Visualization Data Explorer for RISC System/6000	yes	no	yes	no	
SDE WorkBench/6000	yes	yes	yes	yes	
SDE Integrator/6000	yes	yes	yes	yes	
C++ POWERBench/6000	yes	yes	yes	yes	
Fortran POWERBench/6000	yes	yes	yes	yes	
COBOL POWERBench/6000	yes	no	yes	no	

RISC System/6000 Licensed Program Requirements Summary

The following table provides a general summary of the requirements of the IBM licensed programs that are available for the RISC System/6000 systems. Some specific features of these licensed programs may have additional requirements.

RISC System/6000 Licensed Program	Corequisite Software on the RISC System/6000	Considerations
AIX for RISC System/6000, 5756-030	AIXwindows Environment/6000, if using InfoExplorer graphics interface, X-Development Environment (xde), Japanese Kanji, Korean, or Taiwanese support If using BLAS subroutines, use AIX XL FORTRAN Run Time Environment/6000 Version 2.3, or use the Run Time Component of AIX XL Fortran Compiler/6000 Version 3.	Communications facilities require appropriate communications hardware.
AIXwindows Environment/6000, 5601-257	AIX	Appropriate graphics hardware is required.
AIXwindows Interface Composer/6000, 5756-027	AIX AIXwindows Environment/6000	
AIX/6000 Professional Graphics Tool Collection: AIX Computer Graphics Interface Toolkit/6000, 5601-386 AIX Graphics File Translator/6000, 5765-005 AIX Graphics Plotting System/6000, 5765-004	AIX AIXwindows Environment/6000, if using the Enhanced X-Windows system driver An appropriate compiler, if writing programs	Appropriate graphics hardware is required.
AIX InfoCrafter/6000, 5696-108	AIX InfoExplorer License Extension	
AIX XL FORTRAN Compiler/6000 Version 2, 5765-018	AIX	
AIX XL Fortran Compiler/6000 Version 3, 5765-176	AIX	
AIX XL FORTRAN Run Time Environment/6000 Version 2, 5765-019	AIX	
AIX XL Pascal Compiler/6000 Version 1, 5601-254	AIX	
AIX XL Pascal Compiler/6000 Version 2, 5765-245	AIX	
AIX XL Pascal Run Time Environment/6000 Version 1, 5601-251	AIX	

RISC System/6000 Licensed Program	Corequisite Software on the RISC System/6000	Considerations
AIX VS COBOL Compiler/6000, 5601-258	AIX	
AIX VS COBOL Run Time Environment/6000, 5601-259	AIX	
AIX Ada/6000, 5706-291	AIX	
AIX Ada Run Time Environment/6000, 5706-294	AIX	
AIX XL C++ Compiler/6000, 5765-035	AIXWindows Environment/6000 (for the Browser tool only)	
C Set ++ for AIX/6000, 5765-168	AIXwindows Environment/6000 (Browser and HeapView Debugger only)	
AIX SNA Services/6000, 5601-287	AIX	Appropriate communications hardware is required.
AIX 3270 Host Connection Program/6000, 5601-260	AIX AIX SNA Services/6000, if using SNA Type 2.1 connections	Appropriate communications hardware is required.
AIX 3278/79 Emulation/6000, 5601-256	AIX	Appropriate communications hardware is required.
NetWare for AIX/6000 from IBM, 5696-249	AIX	
AIX Open Systems Interconnection Messaging and Filing/6000, 5756-085	AIX	Appropriate communications hardware is required.
AIX AS/400 Connection Program/6000, 5621-051	AIX	Appropriate communications hardware is required.
AIX PC Simulator/6000, 5601-263	AIX IBM Personal Computer DOS, Version 3.30 or 4.0 AIXwindows Environment/6000, for some AIX PC Simulator/6000 features	
AIX Access for DOS Users	AIX DOS Version 5.0 or later must be installed on the Personal Computer	Appropriate communications hardware is required.
AIX Xstation Manager/6000, 5601-457	AIX on the host AIXwindows Environment/6000 on the RISC System/6000 host	Appropriate communications hardware is required.
AIX DirectTalk/6000, 5765-001	AIX	Appropriate communications hardware is required.

RISC System/6000 Licensed Program	Corequisite Software on the RISC System/6000	Considerations
AIX Distributed Computing Environment	AIX AIX DCE Base (installed on each workstation in cell) AIX DCE Security Server/6000 (one instance installed in each cell) AIX DCE Cell Directory Server/6000 (one instance installed in each cell)	
Encina for AIX/6000	AIX AIX Encina Base (installed on each workstation in cell) AIX DCE Base (installed on each workstation in cell) AIX DCE Security Server/6000 (one instance installed in each cell) AIX DCE Cell Directory Server/6000 (one instance installed in each cell)	
AIX High Availability Cluster Multi-Processing/6000 (HACMP/6000)	AIX	
UniTree for AIX/6000	AIX	
AIX Performance Toolbox/6000 and IBM AIX Performance Aide/6000	AIX AIXwindows Environment/6000 AIX TCP/IP	
AIX Ultimedia Services/6000	AIX AIXwindows Environment/6000	
AIX 5080 Emulation Program/6000	AIX AIXwindows Environment/6000 with 3D feature	
AIX Distributed SMIT/6000	AIX AIX TCP/IP NFS (optional)	

RISC System/6000 Licensed Program	Corequisite Software on the RISC System/6000	Considerations
Visualization Data Explorer for RISC System/6000	AIX AIXwindows Environment/6000	
POWERbench and AIX Software Development Environment WorkBench/6000	AIX AIXwindows Environment/6000	

Installation, Customization, and Support

Installation and customization of RISC System/6000 software is simplified by the IBM delivery media options and by the AIX system management tools that assist you in installing and customizing your software.

When you purchase both a RISC System/6000 system unit and the AIX for RISC System/6000 licensed program, the AIX startup system can be preinstalled on a disk drive.

Note: The startup system can be installed on any RISC System/6000 disk drive with 320MB or more of DASD. A system unit equipped with one 160MB internal disk drive cannot have AIX Version 3.2 for RISC System/6000 preinstalled on it. Such a machine is best used as a client system, one that accesses `/usr` from a remote server. See page 2-75 for information on DASD requirements for client systems.

For a system unit with one 320MB internal disk drive, the preinstalled startup system includes the following:

- Base Operating System (BOS) Runtime Environment, including menu-driven system management facilities, through the System Management Interface Tool (SMIT).
- System messages and a subset of InfoExplorer online documentation. (U.S. English is the default.)

For a system unit with at least 400MB of DASD, the preinstalled system can also include AIXwindows Runtime Environment (2D Version), if AIXwindows Environment/6000 is ordered with the base operating system.

Optionally installable AIX operating system extensions are preloaded on your disk drives along with the preinstalled startup system. These optional software products are listed on page 2-77.

Additionally, other selected IBM licensed programs can be preinstalled.

With the startup system installed, the system unit is ready to be started and can run application programs. The system is also ready for installation of AIX extensions, as well as configuration and connection to a LAN.

For customers who would like to specify an exact configuration, the Center for Customer Solutions (CCS) offers a total solution (hardware and software) customization package. This includes preinstalling ordered software to the customer's specification. The customer can specify exact configurations for peripheral devices, customization of user IDs, file systems, environment, network definitions, AIXwindows, and so on. CCS will also install and configure both OEM hardware and OEM software, as well as customer-owned unique applications.

As an added service, CCS will apply programming temporary fixes (PTFs). For more information, contact your IBM Marketing Representative or the Center for Customer Solutions Project Office in the Austin manufacturing plant.

As an alternative to the preinstall option, most IBM software for the RISC System/6000 system is available on the following media:

- 3.5-inch diskettes (for existing licensees only)
- 8 mm tape cartridge
- 1/4-inch tape cartridge.

The AIX system provides management tools through SMIT, as well as through the traditional command line interface. SMIT guides you through the installation and customization process while providing you with information that can help you make decisions about your system environment. As you make decisions, SMIT runs commands that implement your decisions and records a log of these commands in a configuration history file. You can use this configuration history file to simplify and expedite the configuration of additional RISC System/6000 systems. Installation and customization can be performed using communication network facilities.

Support

IBM offers porting and conversion assistance for your key applications and has highly skilled professionals available to help you with system expansion, operations, and applications questions. Consult your IBM marketing representative for more information on these services.

Memory and Disk Space Requirements

The following sections are designed to aid you in determining the random access memory (RAM) requirements and disk drive space requirements for RISC System/6000 licensed programs. The requirement values provided in this document are accurate as of the date of this publication. However, variations to these requirements may occur as a result of modification to software components made by the manufacturer. IBM may periodically update these requirements. Consult your IBM marketing representative for more information about RAM and disk space or about direct access storage device (DASD) requirements.

Random Access Memory Requirements

RISC System/6000 system units can be configured with up to 1024MB of RAM. The amount of RAM that a system requires for optimal performance depends upon many diverse factors. These factors include:

- Number of system users
- Sizes and number of installed licensed programs and local application programs
- Amount of memory for data being processed by applications
- Desired response time.

Note: While most licensed programs mentioned in this section can run in the standard 16MB configuration, IBM AIX DirectTalk/6000 requires 24MB of RAM.

Disk Drive Space Requirements

The following procedure is designed to assist you in determining the amount of disk drive space that is required to support the IBM licensed programs that you plan to install on your RISC System/6000 system unit.

1. Use the "Software Storage Requirements" table to determine the storage requirements of the IBM software that you plan to install on your RISC System/6000 system unit.
2. Verify what corequisite programs may be required for the software you plan to install. These are listed in the "RISC System/6000 Licensed Program Requirements Summary" on page 2-67. Repeat step 1 for all corequisite software and then go to step 3.
3. Calculate system paging space based on the total size of RAM to be configured on your system unit.

Note: The Base Operating System number in the table includes default minimum paging space of 32MB and work space.

- Typically, paging space should be equal to twice the amount of RAM. When RAM exceeds 64MB, paging space should be equal to RAM plus 16MB.
 - Paging space is allocated across disks at time of installation.
 - Paging space is limited to 20% of a given disk.
4. If you plan to install on your system's local disk drive, add 58.6MB to your DASD calculation. This figure includes the Navigation and Using, Managing, and Commands Databases (the minimum required for InfoExplorer use). If you plan to access InfoExplorer through a local or remote CD-ROM, you do not need additional space.
 5. If you are requesting that all IBM licensed programs selected for installation be distributed to you on removable media (that is, tape or diskette), go to step 7.
 6. If you are requesting that AIX for RISC System/6000 or AIXwindows Environment/6000 be distributed to you preinstalled on a disk drive, use the following Software Preinstall

Space Requirements table to determine the space needed. Their preinstalled versions have specific DASD requirements. After consulting the table, do the following:

- a. If the preinstall space required does not exceed the previous calculations for AIX or AIXwindows, go to step 7.
- b. If the preinstall space exceeds the previous sum of your space requirements for AIX or AIXwindows, set your disk drive space requirements equal to the preinstall space, and proceed to step 7.

Note: The preinstall option includes items you may not want. Rather than accepting the disk space value required by this option, you can have some of your IBM licensed programs distributed on removable media. If you want to do this, reevaluate step 6.

Software Preinstall Space Requirements	
Licensed Programs	Preinstall Size (MB)
AIX for RISC System/6000	304.0*
AIXwindows Environment/6000	
2D	76.0
3D Feature	33.0

*Includes space for optional feature codes (such as FDDI and InfoExplorer License Extension), and installation workspace.

7. If ordering a workstation to serve diskless clients, read "DASD Considerations for Diskless Servers" on page 2-75.
8. If ordering a workstation that will access /usr remotely, read "DASD Considerations for Remote /usr Clients" on page 2-75.
9. The sum of your space requirements represents only the IBM licensed programs you plan to install. Add your estimate of how much space you will need for your data and for any additional applications. Include diskless DASD requirements, if applicable.
10. Use this storage total to determine the number and size of RISC System/6000 disk drives you need. Consider that 1MB of software is equal to 1,048,576 storage locations, while 1MB of disk drive capacity is equal to 1,000,000 storage locations. The following table can help you determine your disk drive requirements.

RISC System/6000 Disk Drive	Maximum Software per Disk Drive
IBM 160MB SCSI Disk Drive	152MB
IBM 355MB SCSI Disk Drive	336MB
IBM 400MB SCSI Disk Drive	380MB
IBM 670MB SCSI Disk Drive	636MB
IBM 800MB SCSI Disk Drive (400MB pair)	760MB
IBM 857MB SCSI Disk Drive	816MB
IBM 1GB SCSI-2 Disk Drive	953MB
IBM 1.37GB SCSI Disk Drive	1306MB
IBM 2.4GB SCSI-2 Disk Drive	2288MB

11. If this procedure has resulted in the selection of a system with 400MB or less of DASD, and you intend to request the preinstall option, note the following:
- 160MB systems do not support preinstall options.
 - 320MB systems only support preinstallation of AIX Version 3.2 for RISC System/6000
 - 400MB systems support one of the following preinstall options:
 - AIX Version 3.2 for RISC System/6000 and AIXwindows Environment/6000 (2D Version)
 - AIX Version 3.2 for RISC System/6000 and any other licensed programs except AIXwindows Environment/6000
 - You should ensure that an adequate backup copy is available; a backup copy can be purchased.

If you have selected any other combinations of IBM licensed programs, you need to request distribution of them on removable media, or choose a larger disk capacity for your system.

DASD Considerations for Remote /usr Clients

A client accessing /usr remotely requires only 80MB for its file system subset, including paging space.

For more information on requirements of remote /usr clients, consult the *AIX Version 3.2 Installation Guide*, SC23-2341.

DASD Considerations for Diskless Servers

This section will help you plan for the additional DASD needs of diskless servers, and also will cover general system performance considerations.

After completing this section, take the special DASD requirements of the server and add them to the number you calculated in step 10.

General Considerations

- Paging space. On a diskless system, this is provided exclusively from the server. If you plan to establish a dataless system, that is, one with a local disk for paging space, you need much less, if any paging space, on the server. You move to a dataless system after establishing a diskless system.
- System performance varies according to the number of clients on a server, network load, type of client applications running, and other factors.

Server-Specific Considerations

Depending on your needs, the following server functions can be handled by one server, or spread across multiple servers.

- For file system servers, allow 70MB per Shared Product Object Tree (SPOT). This estimate includes the following software product options within AIX for RISC System/6000: BOS Runtime, Base Application Development Toolkit, BOS Extensions 1 and 2, and Network Support Facilities. It does not include space for other licensed programs. The SPOT includes the boot image, which is shared by all clients.
- For root servers, allow a minimum of 1MB for basic root files. Additional space will be needed to store any client-specific files.
- For paging servers, the amount of paging space should match the amount of RAM available on the client. The default is 32MB.
- For **/home** servers, the amount of DASD varies according to the needs of the client.
- For dump servers, allow a minimum of 8MB on the server. The dump directory contains at least one file for each client.

For more detailed information on the diskless planning considerations for both IBM and non-IBM servers, consult the *AIX Version 3.2 Installation Guide*, SC23-2341.

The following table lists storage requirements for RISC System/6000 licensed programs and for their installable software products.

Software Storage Requirements	
Licensed Programs and Their Installable Software Product Options	Disk Drive Storage Requirements (MB)
AIX for RISC System/6000	
Base Operating System (BOS) Runtime	108.0 (plus paging, if paging needs exceed 32MB)*
Sharable Portion of BOS (bos.data)	1.0
Network Facilities (BOSNET)	**
TCP/IP Applications	3.8
NFS/NIS/RPC Libraries and Utilities	1.9
Simple Network Mgt Protocol Agent	3.7
Network Computing System (NCS)	1.1
InfoExplorer Softcopy Information	
Base System Standard Information	48.4
Programming	40.2
Hardware (available on CD-ROM)	9.8
Data Encryption Standard Library Routines (U.S. only, feature code 5052)	0.1
Extended License Information (feature code 5051)	0.1
High Availability for Network File System (feature code 5053)	0.5
Fiber Distributed Data Interface (feature code 5054)	0.8
Block Multiplexer Channel Device Driver (feature code 5055)	0.3
Enterprise Systems Connection (ESCON)	1.5
BOS Extensions 1 (BOSEXT1)	
Extended Commands	0.3
Sharable Portion of Extended Commands	0.4
Message Handler (MH)	5.3
UNIX to UNIX Copy Program (uucp)	1.3
C Shell	1.0
Remote Customer Services	1.3
CGI Device Drivers	2.3
BOS Extensions 2 (BOSEXT2)	
Accounting Services	1.0
Asynchronous Terminal Emulation (ATE)	0.2
Standard Ethernet Data Link Control	0.6
SDLC Data Link Control	0.3
Token-Ring Data Link Control	0.3
IEEE 802.3 Data Link Control	0.6
X.25 QLLC Data Link Control	0.3
X.25 Applications, API, and sample source	0.5
DOS Utilities	0.4
Games	0.8
Learning BOS information	2.9

* Installation of this item is required.

** If the preinstall option is selected, installation of this item is required.

Software Storage Requirements (continued)	
Licensed Programs and Their Installable Software Product Options	Disk Drive Storage Requirements (MB)
DOS Server	1.0
INed Editor Facilities	1.3
Text Formatting	
Formatting Services	3.4
Shared Data Portion of Formatting Services	0.7
Bibliography Support	0.2
Shared Data Portion of Bibliography Support	0.1
Writers' Tools	0.8
Shareable Portion of Writers' Tools	0.2
Base Graphic Commands	1.2
TranScript Tools	2.3
Troff Xpreviewer	0.6
Fonts for HP Laserjet II	3.6
Fonts for IBM 3812 Printer	3.3
Fonts for IBM 3816 Printer	3.01
Base Operating System Messages***	
English	4.6
German	5.2
Spanish	5.2
French	7.4 (includes man pgs)
Italian	5.2
Belgium-Dutch	5.0
Norwegian	4.9
Swedish	4.9
Japanese	4.9
Korean	4.3
Taiwanese	3.9
Language locales (total)	18.0
XLC Compiler	3.9
Base Application Development Toolkit	
Application Development Toolkit	4.3
Shareable Portion of Application Development Toolkit	0.2
X-Development Environment (xde)	0.3
Base Development Includes and Libraries	7.5
Base Profiling Support	2.1
SCCS Command Help Information	

***Each DASD number for BOS messages includes space taken up by the primary language environment (keyboard maps and default fonts). For single-byte languages (English, German, etc.), this represents 0.2MB. For double-byte languages (Japanese), this represents 4.5MB.

Software Storage Requirements (continued)		
Licensed Programs and Their Installable Software Product Options	Disk Drive Storage Requirements (MB)	
AIXwindows Environment/6000, Version 1.2.4.0		
AIXwindows Run Time Environment	14.5	
Enhanced X-Windows		
2D Graphics Adapter Interface Display Drivers		
X Libraries		
OSF/Motif 1.1 window manager		
Runtime Environment Extensions	20.8**	
AIXwindows Desktop		
AIXwindows Customizing Tool		
Display PostScript		
MSMIT		
RunTime Environment Support for Motif 1.2	3.7	
AIXwindows Development Environment		
AIXwindows Libraries and Include Files	5.7	
AIXwindows Sample Programs	25.8	
AIXwindows Libraries and include Files for Motif 1.2	9.1	
AIXwindows Sample Programs for Motif 1.2	2.2	
AIXwindows Development Fonts	25.9	
InfoExplorer (User Interface Programming database)	28.6	
Messages/Help Text	0.5	
AIXwindows Graphics and 3D Feature (feature code 5051)		
AIXwindows 3D Support	4.9	
AIXwindows GL Run Time Environment	1.0	
AIXwindows GL Development Utilities	0.6	
AIXwindows GL Development Sample Programs	0.6	
Personal graPHIGS Run Time Environment	6.4	
Personal graPHIGS Plotter Support	2.6	
Personal graPHIGS KJ Fonts	0.8	
Personal graPHIGS GKS Compatibility	0.7	
Personal graPHIGS Remote Nucleus	0.3	
Personal graPHIGS Sample Programs	1.7	
Personal graPHIGS Tutorial	4.0	
PHIGS Extension to X (PEX)	4.4	
InfoExplorer documentation (Graphics database)	18.6	
AIXwindows Interface Composer/6000	V1.1.1	V1.2
AIXwindows Interface Composer	18.1	22.0
Messages/Help Text	0.2	0.2
AIX/6000 Professional Graphics Tool Collection:		
AIX Computer Graphics Interface Toolkit/6000	1.4	
Messages/Help Text	0.1	
AIX Graphics File Translator/6000	3.6	
Messages/Help Text	0.1 per language	
AIXGraphics Plotting System/6000	3.0	
AIX InfoCrafter/6000		
InfoCrafter	4.2	
Messages/Help Text	0.1	

** If the preinstall option is selected, installation of this item is required.

Software Storage Requirements (continued)	
Licensed Programs and Their Installable Software Product Options	Disk Drive Storage Requirements (MB)
AIX XL FORTRAN Compiler/6000 Version 2 InfoExplorer documentation Messages/Help Text	8.4 5.0 0.3 (per language)
AIX XL FORTRAN Compiler/6000 Version 3 Run Time Component Run Time Component (messages/help text) Messages/Help Text InfoExplorer documentation	11.5 1.5 0.1 (per language) 0.3 7.5
AIX XL FORTRAN Run Time Environment/6000 Version 2 Messages/Help Text	0.6 0.1 (per language)
AIX XL Pascal Compiler/6000 Version 1 InfoExplorer documentation Messages/Help Text	4.0 3.3 0.2 (per language)
AIX XL Pascal Compiler/6000 Version 2 Run Time Component Run Time component (messages/help text) Messages/Help Text InfoExplorer documentation	4.0 0.3 0.01 (per language) 0.2 3.3
AIX XL Pascal Run Time Environment/6000 Version 1 Messages/Help Text	0.3 0.01 (per language)
AIX VS COBOL Compiler/6000	5.3
AIX VS COBOL Run Time Environment/6000 Messages/Help Text	1.9 0.1 (per language)
AIX Ada Compiler/6000 InfoExplorer documentation	49.6 7.8
AIX Ada Run Time Environment/6000	1.0
AIX XL C++ Compiler/6000 Version 1 InterViews Class Library and NIH Class Library Message/Help Text InfoExplorer documentation	13 19.0 0.3 (per language) 6.6
IBM C Set ++ for AIX/6000 InterViews Class Library Messages/Help Text InfoExplorer documentation	36 17 0.3 (per language) 10.0
AIX SNA Services/6000 SNA Services: LU 1, 2, 3, and 6.2 SNA Services: LU 0 Messages/Help Text	5.5 0.7 0.2 (per language)
AIX 3270 Host Connection Program Messages/Help Text	4.1 0.3 (per language)
AIX 3278/79 Emulation/6000 Messages/Help Text	1.9 0.1 (per language)

Software Storage Requirements (continued)	
Licensed Programs and Their Installable Software Product Options	Disk Drive Storage Requirements (MB)
NetWare for AIX/6000 from IBM Server Programs Filesystem	v3.11 10.7 53.00 ***
AIX Open Systems Interconnection Messaging and Filing/6000	6.5
AIX AS/400 Connection Program/6000	0.6
AIX PC Simulator/6000 Messages/Help Text	3.7 0.1 (per language)
AIX Access for DOS Users (AADU)	0.95
AIX Xstation Manager/6000 Messages/Help Text	2.6 0.1 (per language)
AIX DirectTalk/6000	70.3
AIX Distributed Computing Environment (DCE) Base Services dcebase.base.obj dcebase.dfs.obj dcebase.admin.obj dcebase.appdev.obj dcebase.En_US.msg xdsxom.obj dcepriv.obj dcebaseiEn_US.info (InfoExplorer documentation)	7.6 5.0 2.5 4.7 0.1 1.1 0.2 25.0
AIX DCE Cell Directory Server/6000 dcecds.obj dcecds.En_US.msg	1.4 0.1
AIX DCE Security Server/6000 dcesec.obj dcesec.En_US.msg	2.7 0.1
AIX DCE Threads/6000 dcephthreads.obj dcephthreads.En_US.msg	2.0 0.1
AIX DCE Enhanced Distributed File System/6000 dceedfs.obj dceedfs.En_US.msg	3.4 0.1
AIX DCE Global Directory Server/6000 Server InfoExplorer Softcopy Information	3.5 15.0
AIX DCE Global Directory Client/6000 Client User-level pthreads library Messages XDS/XOM application prot. interface Administrative tools	4.0 2.0 0.2 1.3 10.5

***During installation, the install scripts for NetWare create a file system for use by clients. If the optimal 50MB is not available, the scripts create a 20MB file system. The install will not succeed if less than 20MB is available.

Software Storage Requirements (continued)	
Licensed Programs and Their Installable Software Product Options	Disk Drive Storage Requirements (MB)
Encina Base Feature of AIX DCE Base Services/6000 encExec.obj encExecmEn_US.obj encExeciEn_US.info (InfoExplorer Documentation)	10.0 0.1 15.0
Encina Server for AIX/6000 encServ.obj encServmEn_US.obj	3.0 0.1
Encina Structured File Server for AIX/6000 encSfs.obj encSfsmEn_US.obj	3.0 0.1
Encina Monitor for AIX/6000 encMon.obj	3.0
Encina Peer-to-Peer Executive for AIX/6000 ppcExec.obj ppcExecmEn_US.obj	1.0 0.1
Encina Peer-to-Peer Gateway for AIX/6000 ppcGate.obj ppcGatemEn_US.obj	1.0 0.1
Unitree	16
AIX UltimeMedia Services/6000	10.4
AIX 5080 Emulation Program/6000	2.2 (minimum)
AIX Distributed SMIT/6000 DSMIT Server (if RISC System/6000 Server for SunOS 4.1.3 or HP/UX 9.0 additional storage required) DSMIT Client IBM RISC System/6000 SunOS 4.1.3 HP/UX 9.0	0.5 1.0 0.3 0.3 0.3
IBM Visualization Data Explorer for RISC System/6000	350
POWERbench and AIX Software Development Environment WorkBench/6000 SDE WorkBench/6000 Demo SDE Integrator/6000 CBT C++ POWERbench Fortran POWERbench	20 20 5 20 74 32

Chapter 3. Communications Connectivity Overview

Introduction to RISC System/6000 Communications Offerings

The IBM RISC System/6000 system unit can communicate with many different systems over a variety of networks. This section describes methods of connecting the RISC System/6000 system unit to the following systems and devices:

- Other IBM RISC System/6000 systems
- IBM RT system
- IBM Personal System/2
- IBM Personal Computers (IBM Personal Computer, IBM PC XT, and IBM Personal Computer AT)
- IBM Application System/400
- IBM System/370 and IBM System/390
- Other systems
- IBM Xstations
- ASCII terminals.

All communications methods listed in this publication require the IBM AIX Version 3.2 for RISC System/6000 (AIX for RISC System/6000) licensed program on the RISC System/6000 system unit. Additional software and hardware may be required, depending on the chosen communications applications and methods. Although this publication mentions some software and hardware products as *required* for a particular connection type, other software and hardware that can be substituted for these products may be available.

Communications Documentation

In addition, before ordering communications products, you should consult the publications for the system to which you are connecting.

For general background information about communications concepts, see *Data Communication Concepts*, GC21-5169.

Communications Methods

The RISC System/6000 system unit can communicate as a workstation, as a peer system, or as a host system, depending on the requirements of the connecting system and the chosen communications method.

The RISC System/6000 system unit can use the following types of connections to communicate with other systems:

- Ethernet Version 2 local area network (LAN)
- IEEE 802.3 LAN
- IEEE 802.5 LAN
- IBM Token-Ring LAN
- X.25 wide area network (WAN)
- Synchronous Data Link Control (SDLC) WAN
- Block Multiplexer Channel connection
- Control unit terminal (CUT) coaxial connection
- Distributed Function Terminal (DFT) coaxial connection
- 5088 or 6098 graphics control unit coaxial connection
- Asynchronous connection

- Fiber Distributed Data Interface (FDDI) LAN
- Enterprise Systems Connection Architecture (ESCON)
- Serial Optical Channel
- High-Performance Parallel Interface (HIPPI).

Note: The Model 220 supports only TCP/IP and can communicate with another system using only an Ethernet, IEEE 802.3, or Token-Ring LAN, or an X.25 WAN.

For each of these types of communication connections, both the sending and the receiving systems must use the same data exchange rate and the same communications protocols. Thus, communications hardware and software must be compatible on the communicating systems. The following sections describe the RISC System/6000 support available for these types of connections.

Ethernet Version 2 and IEEE 802.3 LANs

Ethernet Version 2 and IEEE 802.3 LAN connections allow the RISC System/6000 system unit to participate in a 10M-bit Carrier Sense Multiple Access/Collision Detection (CSMA/CD) network. The LAN must adhere to the IEEE 802.3 standard or the Ethernet Version 2 standard.

RISC System/6000 Software Support

The following RISC System/6000 software provides the software base for IBM's Ethernet Version 2 and IEEE 802.3 support on the RISC System/6000 system unit.

- Transmission Control Protocol/Internet Protocol (TCP/IP) suite of communications protocols (included with AIX for RISC System/6000).
- IBM AIX System Network Architecture (SNA) Services/6000 licensed program.
- AIX 3270 Host Connection Program/6000 licensed program.
- AIX AS/400 Connection Program/6000 licensed program.
- IBM AIX Open Systems Interconnection Messaging and Filing/6000 (OSIMF) licensed program (IEEE 802.3 only). See your marketing representative for availability of OSIMF that is compatible with AIX Version 3.2.
- DOS Server program (included with AIX for RISC System/6000).
- Various AIX for RISC System/6000 application programming interfaces (APIs).

TCP/IP, SNA, and OSIMF can run separately or concurrently.

The TCP/IP communications protocols support several end-user communications programs. Through these programs, users can perform such communications tasks as sending, receiving, and processing mail, logging in to connected systems, transferring files to and from connected systems, and running commands on connected systems.

The following RISC System/6000 programs use the TCP/IP communications protocols to communicate on an Ethernet LAN:

- Network File System (NFS) (included with AIX for RISC System/6000)
- Standard TCP/IP application programs (included with AIX for RISC System/6000)
- Basic Networking Utilities (BNU/UUCP) (included with AIX for RISC System/6000)
- Mail facilities (included with AIX for RISC System/6000)
- Network Computing System (NCS) (included with AIX for RISC System/6000)
- Enhanced X-Windows interface (included with the IBM AIXwindows Environment/6000 licensed program).

AIX SNA Services/6000 supports communications on an Ethernet or IEEE 802.3 LAN through a programming interface for LU 1, 2, 3, or 6.2. Application developers can write programs that use SNA LU 6.2 to communicate with other systems. When communicating with other systems through SNA LU 6.2, the RISC System/6000 system unit functions as a peer SNA node.

AIX 3270 Host Connection Program/6000 supports communications on an Ethernet or IEEE 802.3 LAN to an IBM System/370 or System/390 through an AIX SNA Services/6000 interface for LU 1, 2, and 3. Support is also provided for TCP/IP connections. The licensed program supports file transfer, printer emulation, and an application programming interface High Level Language API. (HLLAPI) that allows a user-provided workstation application to communicate with a host application in an automation environment.

AIX AS/400 Connection Program/6000 supports communications on an Ethernet LAN to an IBM Application System/400 (AS/400) system. The program uses either SNA or TCP/IP communications protocols, and it supports 5250 emulation.

OSIMF supports communications on an IEEE 802.3 LAN to other systems that support the Open Systems Interconnection (OSI) standards specified by the International Organization for Standardization (ISO). Certain OSIMF functions, such as FTAM/FTP gateway and TCP/IP gateway, require TCP/IP to be installed.

For non-OSI systems running TCP/IP, FTAM-to-FTP gateway services provide ASCII (text) and binary (object) file transfer capability between the OSI and the TCP/IP networks. The gateway services allow FTAM client users to access files stored on a TCP/IP FTP server, and FTP client users to access files stored on an OSI FTAM server.

The MHS/IPM-to-SMTP gateway, based on RFC-987, provides message exchange services between the OSI and TCP/IP networks. The gateway services translate Simple Message Transfer Protocol (SMTP) messages from AIX or other UNIX-based nodes on TCP/IP networks into MHS messages understood by an MHS node on OSI networks. The services also translate MHS messages into SMTP messages.

The DOS Server program allows a user at an IBM Personal System/2 or an IBM Personal Computer to use the RISC System/6000 system unit as a file or print server, and to run AIX commands on the RISC System/6000 system unit.

RISC System/6000 Hardware Support

The type of hardware support for communication on an Ethernet Version 2 or IEEE 802.3 LAN varies according to the type of system unit you have. The IBM Ethernet High-Performance LAN Adapter provides this support. This adapter can connect to either the standard 50-ohm (thick) coaxial cable or the RG-58A/U (thin) coaxial cable.

IBM Token-Ring LAN

The IBM Token-Ring LAN connection allows the RISC System/6000 system unit to participate in a LAN adhering to the IEEE 802.5 Token-Passing Ring standard or the ECMA standard 89 for Token-Ring, baseband LANs.

RISC System/6000 Software Support

The following RISC System/6000 software provides the software base for IBM's Token-Ring support on the RISC System/6000 system unit:

- TCP/IP suite of communications protocols (included with AIX for RISC System/6000).
- AIX SNA Services/6000 licensed program.
- AIX 3270 Host Connection Program/6000 licensed program.
- AIX X-Windows 3270 Emulator/6000 licensed program.

- AIX AS/400 Connection Program/6000 licensed program.
- IBM AIX Open Systems Interconnection Messaging and Filing/6000 (OSIMF) licensed program. See your marketing representative for availability of OSIMF that is compatible with AIX Version 3.2.
- DOS Server program (included with AIX for RISC System/6000).
- Various AIX for RISC System/6000 APIs.

TCP/IP, SNA, and OSIMF can run separately or concurrently.

The TCP/IP communications protocols support several end-user communication programs. Through these programs, users can perform such communication tasks as sending, receiving, and processing mail, logging in to connected systems, transferring files to and from connected systems, and running commands on connected systems.

The following RISC System/6000 programs are some of the programs that use the TCP/IP communications protocols to communicate on a Token-Ring LAN:

- NFS (included with AIX for RISC System/6000)
- Standard TCP/IP application programs (included with AIX for RISC System/6000)
- BNU (included with AIX for RISC System/6000)
- Mail facilities (included with AIX for RISC System/6000)
- NCS (included with AIX for RISC System/6000)
- Enhanced X-Windows interface (included with IBM AIXwindows Environment/6000 licensed program).

AIX SNA Services/6000 supports communications on a Token-Ring LAN through a programming interface for LU 1, 2, 3, or 6.2. Application developers can write programs that use SNA LU 6.2 to communicate with other systems. When communicating with other systems through SNA LU 6.2, the RISC System/6000 system unit functions as a peer SNA node.

AIX 3270 Host Connection Program/6000 supports communications on a Token-Ring LAN to an IBM System/370 or System/390 through an AIX SNA Services/6000 interface for LU 1, 2, and 3. Support is also provided for TCP/IP connections. The licensed program supports file transfer, printer emulation, and an application programming interface High Level Language API. (HLLAPI) that allows a user-provided workstation application to communicate with a host application in an automation environment.

AIX X-Windows 3270 Emulator/6000 supports communications on a Token-Ring LAN on TCP/IP communications protocols. It enhances interoperability by operating on RISC System/6000 systems that have acceptable TCP/IP LAN access to System/370 and System/390 systems and applications.

AIX AS/400 Connection Program/6000 supports communications on a Token-Ring LAN to an IBM Application System/400 (AS/400) system. The program uses either SNA or TCP/IP communications protocols, and it supports 5250 emulation.

OSIMF supports communications on a Token-Ring LAN to other systems that support the Open Systems Interconnection (OSI) standards specified by the International Organization for Standardization (ISO). Certain OSIMF functions, such as FTAM/FTP gateway and TCP/IP gateway, require TCP/IP to be installed.

For non-OSI systems running TCP/IP, FTAM-to-FTP gateway services provide ASCII (text) and binary (object) file transfer capability between the OSI and the TCP/IP networks. The

gateway services allow FTAM client users to access files stored on a TCP/IP FTP server, and FTP client users to access files stored on an OSI FTAM server.

The MHS/IPM-to-SMTP gateway, based on RFC-987, provides message exchange services between the OSI and TCP/IP networks. The gateway services translate Simple Message Transfer Protocol (SMTP) messages from AIX or other UNIX-based nodes on TCP/IP networks into MHS messages understood by MHS nodes on OSI networks. The services also translate MHS messages into SMTP messages.

The DOS Server program allows a user at an IBM Personal System/2 or an IBM Personal Computer to use the RISC System/6000 system unit as a file or print server, and it allows a user to execute AIX commands on the RISC System/6000 system unit.

RISC System/6000 Hardware Support

The IBM Token-Ring High-Performance Network Adapter supports communications on a Token-Ring LAN. The data interchange clock rate of the LAN can be either 4M bits per second or 16M bits per second.

X.25 WAN

The X.25 Wide Area Network connection allows the RISC System/6000 system unit to connect to a public network that adheres to CCITT Recommendation X.25 (1980 or 1984) for the interface between data terminal equipment (DTE) and packet-switching data networks.

IBM supports connection to the X.25 WAN through the EIA-232D/V.24, X.21, and V.35 interfaces.

RISC System/6000 Software Support

The following RISC System/6000 software provides the software base for IBM's X.25 WAN support on the RISC System/6000 system unit:

- TCP/IP suite of communications protocols (included with AIX for RISC System/6000).
- AIX SNA Services/6000 licensed program.
- AIX 3270 Host Connection Program/6000 licensed program.
- IBM AIX Open Systems Interconnection Messaging and Filing/6000 (OSIMF) licensed program. See your marketing representative for availability of OSIMF that is compatible with AIX Version 3.2.
- Various AIX for RISC System/6000 APIs, including the X.25 API.

TCP/IP, SNA, and OSIMF can run separately or concurrently.

The TCP/IP communications protocols support several end-user communications programs. Through these programs, users can perform such communications tasks as sending, receiving, and processing mail, logging in to connected systems, transferring files to and from connected systems, and running commands on connected systems.

TCP/IP commands that require broadcast messages, such as **rwho** and **timed**, will not work over X.25.

The following RISC System/6000 programs are some of the programs that use the TCP/IP communications protocols to communicate on an X.25 WAN:

- Standard TCP/IP application programs (included with AIX for RISC System/6000)
- BNU (included with AIX for RISC System/6000)
- Mail facilities (included with AIX for RISC System/6000).

Note: Network File System (NFS) is not supported over an X.25 WAN.

AIX SNA Services/6000 supports communications on an X.25 WAN through a programming interface for LU 6.2/QLLC. Application developers can write programs that use SNA LU 6.2 to communicate with other systems. When the RISC System/6000 system unit communicates with other systems through SNA LU 6.2, the RISC System/6000 system unit functions as a peer SNA node.

AIX 3270 Host Connection Program/6000 supports communications on an X.25 WAN to an IBM System/370 or System/390 through an AIX SNA Services/6000 interface for LU 1, 2, and 3. Support is also provided for TCP/IP connections. The licensed program supports file transfer, printer emulation, and an application programming interface High Level Language API. (HLLAPI) that allows a user-provided workstation application to communicate with a host application in an automation environment.

OSIMF program supports communications on an X.25 WAN to other systems that support the Open Systems Interconnection (OSI) standards specified by the International Organization for Standardization (ISO). Certain OSIMF functions, such as FTAM/FTP gateway and TCP/IP gateway, require TCP/IP to be installed.

For non-OSI systems running TCP/IP, FTAM-to-FTP gateway services provide ASCII (text) and binary (object) file transfer capability between OSI and TCP/IP networks. The gateway services allow FTAM client users to access files stored on a TCP/IP FTP server, and FTP client users to access files stored on an OSI FTAM server.

The MHS/IPM-to-SMTP gateway, based on RFC-987, provides message exchange services between the OSI and TCP/IP networks. The gateway services translate Simple Message Transfer Protocol (SMTP) messages from AIX or other UNIX-based nodes on TCP/IP networks to MHS messages understood by MHS nodes on OSI networks. The services also translate MHS messages to SMTP messages.

X.25 facilities (included with AIX for RISC System/6000) include message and file transfer capabilities and a link control and line monitoring program. The X.25 API (also included with AIX for RISC System/6000) permits programmers to write their own X.25 applications.

RISC System/6000 Hardware Support

The IBM X.25 Interface Co-Processor/2 supports communications on an X.25 WAN through any of the following selectable interfaces: X.21, EIA-232D/V.24, or V.35. The maximum supported line speed for data interchange from the RISC System/6000 system unit depends on the type of physical connection; up to 19.2K bits per second for an EIA-232D/V.24 connection, up to 64K bits per second for an X.21 connection, or up to 56K bits per second for a V.35 connection.

SDLC WAN

The SDLC WAN connection allows the RISC System/6000 system unit to participate in a WAN for managing synchronous half-duplex, code-transparent, serial-by-bit information transfers over a link connection.

RISC System/6000 Software Support

The following RISC System/6000 software provides the software base for IBM's SDLC WAN support on the RISC System/6000 system:

- AIX SNA Services/6000 licensed program
- AIX 3270 Host Connection Program/6000 licensed program
- AIX AS/400 Connection Program/6000 licensed program
- Various AIX for RISC System/6000 APIs.

AIX SNA Services/6000 supports communications on an SDLC WAN through a programming interface for LU 0, 1, 2, 3, or 6.2. Application developers can write programs that use SNA LU 6.2 to communicate with other systems. When communicating with other systems through SNA LU 6.2, the RISC System/6000 system unit functions as a peer SNA node.

AIX 3270 Host Connection Program/6000 supports communications on an SDLC WAN to an IBM System/370 or System/390 through an AIX SNA Services/6000 interface for LU 1, 2, and 3. Support is also provided for TCP/IP connections. The licensed program supports file transfer, printer emulation, and an application programming interface High Level Language API. (HLLAPI) that allows a user-provided workstation application to communicate with a host application in an automation environment.

AIX AS/400 Connection Program/6000 supports communications on an SDLC WAN to an IBM Application System/400 (AS/400) system. The program uses either SNA or TCP/IP communications protocols, and supports 5250 emulation.

RISC System/6000 Hardware Support

The Multiprotocol Adapter (MP/A) or the IBM 4-Port Multiprotocol Communications Controller, with the 4-Port Multiprotocol Interface Cable, supports communications on an SDLC WAN through any of the following selectable interfaces: X.21, EIA-232/V.24, EIA-422A, or V.35.

The maximum supported line speed for data interchange from the RISC System/6000 system unit depends on the physical connection type; up to 19.2K bits per second for an EIA-232D/V.24 connection, up to 64K bits per second for an X.21 connection or an EIA-422A connection, and up to 56K bits per second for a V.35 connection.

Block Multiplexer Channel Connection

The Block Multiplexer Channel Connection allows the RISC System/6000 to communicate directly with a host System/370 or System/390. The host operating system views the system unit as a control unit.

RISC System/6000 Software Support

AIX for RISC System/6000, along with the separately orderable S/370 Block Multiplexer Channel device driver (feature code 5055), provides the software base for IBM's Block Multiplexer Channel Connection. The System Management Interface Tool, part of AIX for RISC System/6000, is required for operator online/offline control. Multipath Mode is not supported. The following RISC System/6000 software provides the software basis for block multiplexer support:

- TCP/IP suite of communications protocols (included with AIX for RISC System/6000)
- AIX 3270 Host Connection Program/6000 licensed program
- User-written protocol support similar to channel-to-channel programming.

The TCP/IP communications protocols support several end-user communications programs. Through these programs, users can perform such communications tasks as sending, receiving, and processing mail, logging in to connected systems, transferring files to and from connected systems, and running commands on connected systems.

The following RISC System/6000 programs are some of the programs that use the TCP/IP communications protocols to communicate between a RISC System/6000 and a System/370 or System/390:

- NFS (included with AIX for RISC System/6000)
- Standard TCP/IP application programs (included with AIX for RISC System/6000)

- BNU (included with AIX for RISC System/6000)
- Mail facilities (included with AIX for RISC System/6000)
- NCS (included with AIX for RISC System/6000)
- Enhanced X-Windows interface (included with IBM AIXwindows Environment/6000 licensed program).

AIX 3270 Host Connection Program/6000 supports communications on a Block Multiplexer Channel using TCP/IP protocol to an IBM System/370 or System/390. The licensed program supports file transfer, printer emulation, and an application programming interface High Level Language API (HLLAPI) that allows a user-provided workstation application to communicate with a host application in an automation environment.

RISC System/6000 Hardware Support

The IBM Block Multiplexer Channel Adapter supports the connection of the RISC System/6000 system unit to a System/370 or System/390 block multiplexer channel.

The processors supported by the System/370 Block Multiplexer Channel Adapter are summarized in the following table. Certain processors can use the IBM 9034 Model 1 ESCON Converter or the IBM 3044 Model 2 Channel Extender. You cannot use both a 9034 and a 3044 on the same channel.

System Processor	Channel Type	Speed(max.)
9021	Parallel	4.5MB
9021	ESCON*	4.5MB
9121	Parallel	4.5MB
9121	ESCON*	4.5MB
9221	Parallel	4.5MB
9221	ESCON*	4.5MB
ES/3090	Parallel	4.5MB
ES/3090 (J)	ESCON*	4.5MB
308x	Parallel	3.0MB
308x	ESCON	3.0MB
4381	Parallel	3.0MB
4381	ESCON	3.0MB

*Requires use of the 9034 Model 1 ESCON Converter.

For more information on the 9034 and 3044, see page 3-8.

ESCON Channel Connection

The ESCON channel connection allows the RISC System/6000 to communicate directly with a host System/390. The host operating system views the system unit as a control unit.

RISC System/6000 Software Support

AIX for RISC System/6000, along with the separately orderable ESCON Channel adapter device driver (feature code 5056), provides the software base for IBM's ESCON channel connection. The System Management Interface Tool, part of AIX for RISC System/6000, is required for operator online/offline control. Multipath mode is not supported. The following RISC System/6000 software provides the software basis for the ESCON channel support:

- TCP/IP suite of communications protocols (included with AIX for RISC System/6000)
- AIX 3270 Host Connection Program/6000 licensed program
- User-written protocol support similar to channel-to-channel programming.

The TCP/IP communications protocols support several end-user communications programs. Through these programs, users can perform such communications tasks as sending, receiving, and processing mail, logging in to connected systems, transferring files to and from connected systems, and running commands on connected systems.

The following RISC System/6000 programs are some of the programs that use the TCP/IP communications protocols to communicate on an ESCON channel:

- NFS (included with AIX for RISC System/6000)
- Standard TCP/IP application programs (included with AIX for RISC System/6000)
- BNU (included with AIX for RISC System/6000)
- Mail facilities (included with AIX for RISC System/6000)
- NCS (included with AIX for RISC System/6000)
- Enhanced X-Windows interface (included with IBM AIXwindows Environment/6000 licensed program).

AIX 3270 Host Connection Program/6000 supports communications on an ESCON channel using the TCP/IP Telnet option to a System/390. The licensed program supports file transfer, printer emulation, and an application programming interface High Level Language API (HLLAPI) that allows a user-provided workstation application to communicate with a host application in an automation environment.

RISC System/6000 Hardware Support

The IBM ESCON Channel Adapter supports the connection of the RISC System/6000 system unit to a System/390 ESCON channel.

The processors supported by the System/390 ESCON Channel Adapter are summarized in the following table.

System Processor	Channel Type	Speed (max.)
9021	ESCON	10MB/17MB
9121	ESCON	10MB
9221	ESCON	10MB
ES/3090 (J)	ESCON	10MB

CUT Coaxial Connection

The CUT coaxial connection allows the RISC System/6000 system unit to connect to the System/370 or System/390 by way of an IBM 3174 or 3274 Display Control Unit. Through this method of connection, a RISC System/6000 virtual terminal can emulate a subset of IBM 3278 or 3279 Display Station functions.

RISC System/6000 Software Support

The IBM AIX 3278/79 Emulation/6000 licensed program provides the software base for IBM's CUT connection support on the RISC System/6000 unit. AIX 3278/79 Emulation/6000 supports a subset of 3278/79 functions.

RISC System/6000 Hardware Support

The IBM 3270 Connection Adapter supports communications through a CUT coaxial connection.

AIX 3278/79 Emulation/6000 does not provide support for ASCII terminals.

DFT Coaxial Connection

The DFT connection allows the RISC System/6000 system unit to connect to the System/370 or System/390 by way of an IBM 3174 or 3274 Control Unit. Through this method of connection, a RISC System/6000 virtual terminal can emulate a subset of IBM 3270 display station and printer functions.

RISC System/6000 Software Support

The IBM AIX 3270 Host Connection Program/6000 licensed program provides the software base for IBM's SNA or non-SNA DFT connection support on the RISC System/6000. SNA Services/6000 is not required for DFT mode. This program supports file transfer, multiple 3278 and 3279 terminal emulation sessions, an application programming interface High Level Language API (HLLAPI), and 3286/3287 printer emulation.

RISC System/6000 Hardware Support

The IBM 3270 Connection Adapter supports communications through a SNA or non-SNA DFT coaxial connection.

5088 or 6098 Graphics Control Unit Connection

The 5088 or 6098 Graphics Control Unit connection allows the RISC System/6000 system unit to connect to the System/370 or System/390 by way of the IBM 5088 or IBM 6098 Graphics Control Unit. Through this method of connection, a RISC System/6000 virtual terminal can emulate a subset of 3270 Display Station functions.

RISC System/6000 Software Support

The IBM AIX 3270 Host Connection Program/6000 licensed program supports the connection of the RISC System/6000 system unit to a System/370 or System/390 attached to a IBM 5088 or IBM 6098 Graphics Control Unit. This program supports file transfer, multiple 3278 and 3279 terminal emulation sessions, and an application programming interface High Level Language API (HLLAPI) support.

RISC System/6000 Hardware Support

The IBM System/370 Host Interface Adapter supports the connection of the RISC System/6000 system unit to a System/370 or System/390 by way of the IBM 5088 or 6098 Graphics Control Unit.

Asynchronous Connection

Asynchronous connection allows the RISC System/6000 system unit to connect remotely to other systems through any of the following types of physical connections: EIA-232D/V.24, EIA-422A, or MIL-STD 188. The maximum supported line speed for data interchange from the RISC System/6000 system unit over an asynchronous connection is 38.4K bits per second.

RISC System/6000 Software Support

The following RISC System/6000 software provides the software base for IBM's asynchronous connection support on the RISC System/6000 system unit:

- TCP/IP suite of communications protocols, using Serial Line Internet Protocol (SLIP) mode. TCP/IP is included with AIX for RISC System/6000.
- BNU (included with AIX for RISC System/6000).
- Asynchronous Terminal Emulation (ATE) program (included with AIX for RISC System/6000).
- DOS Server program (included with AIX for RISC System/6000).
- Various AIX for RISC System/6000 APIs.

The TCP/IP communications protocols support several end-user communications programs. Through these programs, users can perform such communications tasks as sending, receiving, and processing mail, logging in to connected systems, transferring files to and from connected systems, and running commands on connected systems.

IBM offers the following RISC System/6000 programs that use the TCP/IP communications protocols to communicate through an asynchronous connection:

- Standard TCP/IP application programs, using Serial Line Internet Protocol (SLIP) Mode. TCP/IP is included with AIX for RISC System/6000.
- BNU (included with AIX for RISC System/6000).
- Mail facilities (included with AIX for RISC System/6000).

BNU can also be used independently of TCP/IP to allow users to log in to connected systems, transfer files between systems, and execute commands and queue jobs at remote systems.

ATE provides an alternate application program for asynchronous communications. ATE allows users to connect and log in to connected systems. The user's display emulates a DEC VT 100 terminal. ATE supports file transfer and remote command execution.

The DOS Server program allows a user at an IBM Personal System/2 or an IBM Personal Computer to use the RISC System/6000 system as a file or print server, and to execute AIX commands on the RISC System/6000 system unit.

RISC System/6000 Hardware Support

IBM provides support for asynchronous communications through the EIA-232D/V.24, EIA-422A, and MIL-STD 188 interfaces. The following ports and adapters support asynchronous communications:

- The two standard EIA-232 ports in each RISC System/6000 system unit
- IBM 8-Port Async Adapter-EIA-232 with the IBM Multiport Interface Cable
- IBM 8-Port Async Adapter-EIA 422A with the IBM Multiport Interface Cable
- IBM 8-Port Async Adapter-MIL-STD188 with the IBM Multiport Interface Cable
- IBM 16-Port Async Adapter-EIA-232 with the IBM 16-Port Interface Cable-EIA-232
- IBM 16-Port Async Adapter-EIA-422A with the IBM 16-Port Interface Cable-EIA-422A
- IBM 128-Port Async Controller with IBM Remote Async Nodes.

Fiber Distributed Data Interface (FDDI) LAN

RISC System/6000 system units can participate in both single- and dual-attach FDDI local area networks (LANs). A FDDI LAN can be up to 100 km (62 miles) and can include up to 500 system units. There can be up to 2 km (1.24 miles) between system units or concentrators.

RISC System/6000 Software Support

AIX for RISC System/6000, along with the separately orderable FDDI device driver (feature code 5054), provides the software base for IBM's FDDI support.

RISC System/6000 Hardware Support

The IBM FDDI Adapter supports communications over a FDDI LAN. The base adapter, available as feature code 2720, provides a single-attaching station option and attaches to the primary ring directly, or using an IBM 8240 FDDI Concentrator. Connection through an external concentrator isolates the workstations from the primary ring and protects the network from routine station on or off cycles, as well as from individual station failures.

The dual-attach upgrade, available as feature code 2722, provides the ability to attach to a FDDI network's primary and secondary ring. In the event of failure, a dual attachment allows wrapping of the primary to the secondary ring for higher network availability and faster problem isolation. The upgrade can also attach to concentrator ports as a single-attached station or a dual-homing station.

A bridge is required to link a FDDI LAN to either a Token-Ring or Ethernet LAN. Concentrators and bridges are customer-supplied. Fiber optic cable is available from IBM-authorized distributors.

Serial Optical Channel

A Serial Optical Channel Connection allows a RISC System/6000 system unit to communicate with another RISC System/6000 system unit, or with high-performance heterogeneous networks. Network communication is in conjunction with a router from the Network Systems Corporation (NSC) Data Exchange (DX) series of network controllers. The link uses standard AIX and UNIX interfaces. Consult with an NSC representative for more information about the router.

RISC System/6000 Software Support

The TCP/IP suite of communications protocols, included with AIX for RISC System/6000, provides the software base for IBM's Serial Optical Channel link.

TCP/IP commands that require broadcast messages, such as **rwho** and **timed**, will not work on a Serial Optical Channel Connection.

RISC System/6000 Hardware Support

The IBM Serial Optical Channel Converter supports communication through a Serial Optical Channel.

High Performance Parallel Interface (HIPPI) Network

RISC System/6000 system units can attach to a High Performance Parallel Interface (HIPPI) network as defined by the ANSI specifications. The HIPPI channel supports burst rates of 100MBps over dual simplex cables. Connections can be up to 25 KM in length as defined by the standard and can be extended using third party HIPPI switches and third-party fiber optic extenders.

RISC System/6000 Software Support

AIX version 3.2 for the RISC System/6000, along with the separately orderable IBM AIX High Performance Parallel Interface Driver Group/6000 (Program Product 5696-658), provides the software base for HIPPI support. The HIPPI/6000 Driver Group includes the following drivers:

- HIPPI adapter driver
- IPI-3 master mode driver

- IPI-3 slave mode driver
- HIPPI-LE driver (for use with IP services such as TCP and UDP)
- IPI-3 user transport services
- IBM 9570 Disk Array Subsystem Driver.

The TCP/IP suite of communications protocols is fully supported for use with HIPPI except for TCP/IP commands that require broadcast messages, such as **rwho** and **timed**, which will not work on a HIPPI network. In addition, standard UDP and sockets are supported.

The IPI-3 master and slave drivers can also be used together to provide memory-to-memory transfers or message passing capability between hosts.

RISC System/6000 Hardware Support

The IBM High Performance Parallel Interface (HIPPI) Micro Channel Adapter Set allows select models of the RISC System/6000 product line to attach to an industry-standard HIPPI network. The adapter set is a first-party bus master Micro Channel adapter capable of 80MBps transfer rates. The adapter set, which consists of three type five Micro Channel cards, contains processor card, HIPPI transmit card, and HIPPI receive card, and supports simultaneous HIPPI transmit and receive sessions. All other components of the HIPPI network, such as switches, fiber optic extenders, and cables, are customer-supplied and are available from third party vendors. The Feature Code for the HIPPI adapter set is 2735.

Communications Using Modems

Modem support allows communications through common carrier telephone networks using dial-up or leased lines with either asynchronous protocols or synchronous SDLC or BSC protocols. See "Hardware Offerings" on page 1-102 for information on the modems supported by the RISC System/6000 system unit. Not all features supported by the listed modems are supported by the RISC System/6000 software.

Application Program Interfaces

Many of the IBM communications programs offer application programming interfaces (APIs) to allow application developers to use their own code with IBM software. Because some of the IBM communications programs work with a variety of connection methods (for example Ethernet LAN, Token-Ring LAN, and X.25 and SDLC WANs), some APIs provide a programming interface to multiple connection methods.

APIs vary greatly. Some APIs are subroutine libraries, while others are systems calls. The *AIX Version 3.2 Technical Reference, Volume 3*, provides information about many of the APIs available with RISC System/6000 communications programs.

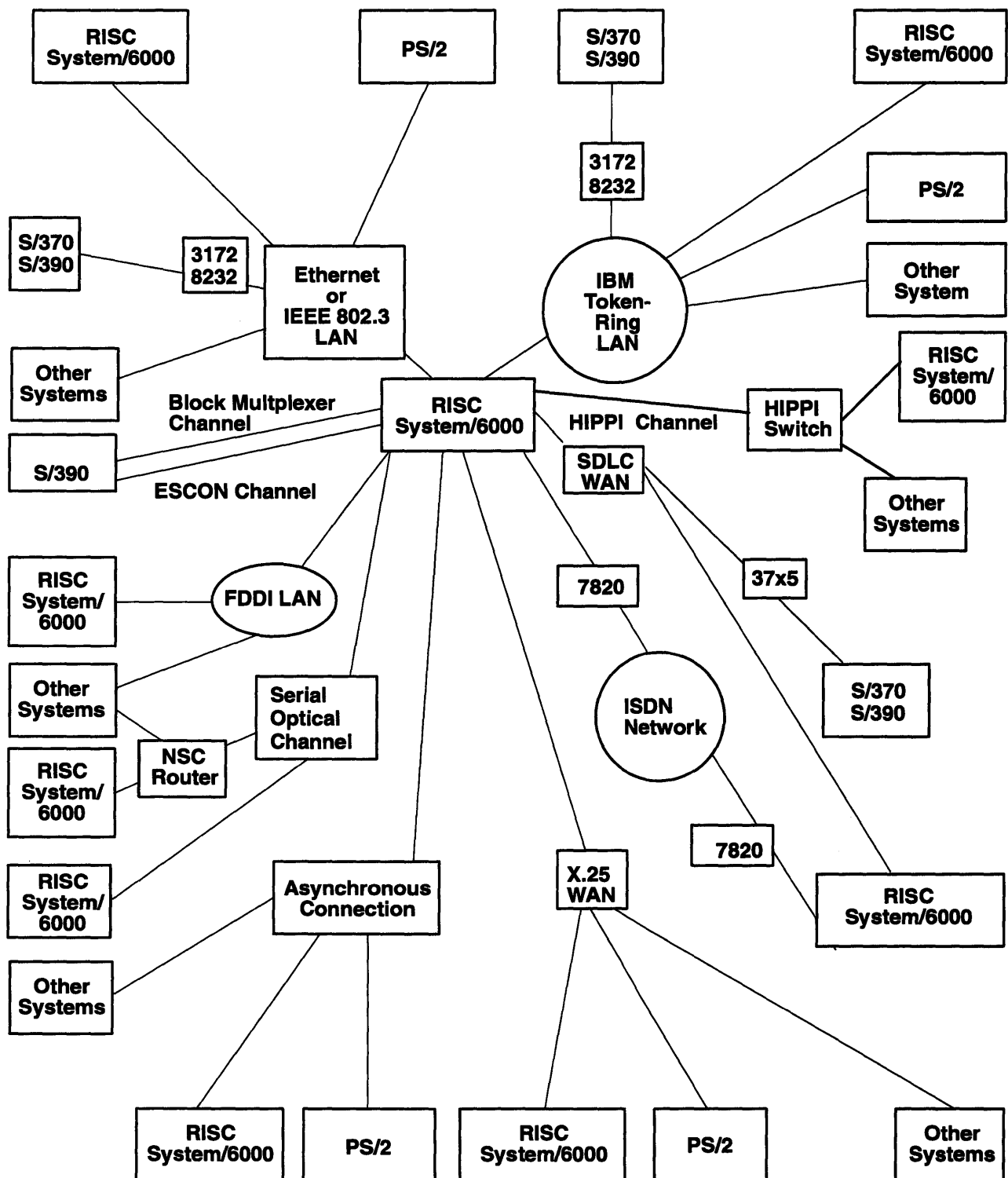
Information about these APIs is also available through the IBM RISC System/6000 Hypertext Information Base Library.

Communicating with Systems Running the AIX Operating System or Another UNIX-Based Operating System

IBM offers many software and hardware products that support communications between the RISC System/6000 system unit and other systems running a UNIX-based operating system. See the illustration on the following page for an outline of the general communications methods that these products support.

The following sections detail the methods of connectivity that IBM products provide for communications between the RISC System/6000 system unit and the following systems:

- Other RISC System/6000 system units running the IBM AIX Version 3 for the RISC System/6000 licensed program
- IBM Personal System/2s running Version 1.2 or 1.2.1 of the IBM Advanced Interactive Executive for the Personal System/2 (AIX PS/2) licensed program
- IBM System/370s or IBM System/390s running Version 1.0 of the IBM Advanced Interactive Executive for the System/370 (AIX/370) licensed program, and IBM Advanced Interactive Executive for the IBM Enterprise System Architecture (AIX/ESA)
- Other systems running a UNIX-based operating system.



**Connectivity with Systems Running the AIX Operating System
or
Another UNIX-Based Operating System**

Note: The RISC System/6000 system, the PS/2, and the System/370 shown in this figure are running the AIX operating system.

Communications between RISC System/6000 Systems

RISC System/6000 system units running IBM AIX Version 3 for RISC System/6000 can communicate with each other through any of the ways presented in the following table. The table also mentions products that support the various connection methods.

Note: The Model 220 supports TCP/IP and can communicate with other RISC System/6000 system units using only an Ethernet Version 2, IEEE 802.3, or Token-Ring LAN, or an X.25 WAN.

Communications between RISC System/6000 Systems		
Network or Connection Type	RISC System/6000 Software Offerings	RISC System/6000 Hardware Offerings
Ethernet Version 2 or IEEE 802.3 LAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX – TCP/IP applications in AIX – BNU in AIX – Mail facilities in AIX – NCS in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program • AIX SNA Services/6000 licensed program • OSIMF/6000 licensed program (IEEE 802.3 only). 	<ul style="list-style-type: none"> • Ethernet High-Performance LAN Adapter. • Integrated Ethernet adapters for Models 220, 340, and 350
HIPPI Network	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX – TCP/IP applications in AIX – BNU in AIX – Mail facilities in AIX – NCS in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program • IPI-3 master/slave protocols supplied with the HIPPI driver group offering can be used for performing memory-to-memory transfers, message passing, or device emulation. 	<ul style="list-style-type: none"> • High Performance Parallel Interface (HIPPI) Micro Channel Adapter Set.
Token-Ring LAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX – TCP/IP applications in AIX – BNU in AIX – Mail facilities in AIX – NCS in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program • AIX SNA Services/6000 licensed program • OSIMF/6000 licensed program. 	<ul style="list-style-type: none"> • Token-Ring High-Performance Network Adapter.

Communications between RISC System/6000 Systems		
Network or Connection Type	RISC System/6000 Software Offerings	RISC System/6000 Hardware Offerings
X.25 WAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP applications in AIX – BNU in AIX – Mail facilities in AIX • SNA LU 6.2/QLLC in AIX SNA Services/6000 licensed program • OSIMF/6000 licensed program • X.25 API and the X.25 facilities in AIX. 	<ul style="list-style-type: none"> • X.25 Interface Co-Processor/2.
SDLC WAN	AIX SNA Services/6000 licensed program.	4-Port Multiprotocol Communications Controller with the 4-Port Multiprotocol Cable Assembly. Multiprotocol Adapter (MP/A)
Asynchronous Connection	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP applications in AIX – BNU in AIX – Mail facilities in AIX • ATE in AIX. 	<ul style="list-style-type: none"> • Two standard EIA-232D ports in the RISC System/6000 system unit • 8-Port Async Adapter-EIA-232 with the IBM Multiprot Interface Cable • 8-Port Async Adapter-EIA-422A with the IBM Multiprot Interface Cable • 8-Port Async Adapter-MIL-STD 188 with the IBM Multiprot Interface Cable • 16-Port Async Adapter-EIA-232 with the IBM 16-Port Interface Cable-EIA-232 • 16-Port Async Adapter-EIA-422A with the IBM 16-Port Interface Cable-EIA-422A • 128-Port Async Controller with IBM Remote Async Nodes.

Communications between RISC System/6000 Systems		
Network or Connection Type	RISC System/6000 Software Offerings	RISC System/6000 Hardware Offerings
FDDI LAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX – TCP/IP applications in AIX – BNU in AIX – Mail facilities in AIX. 	<ul style="list-style-type: none"> • IBM FDDI Adapter.
ISDN WAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP applications in AIX – BNU in AIX – Mail facilities in AIX • SNA LU 6.2/QLLC in AIX SNA Services/6000 licensed program • X.25 API and X.25 facilities. • SNA LU 6.2/SDLC in AIX SNA Services/6000 licensed program. 	<ul style="list-style-type: none"> • X.25 Interface Co-processor/2 in conjunction with IBM 7820 ISDN Terminal Adapter. • 4-port Multiprotocol Communications Controller with 4-Port Multiprotocol Cable Assembly in conjunction with IBM 7820 Terminal Adapter.
Serial Optical Channel Converter	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX – TCP/IP applications in AIX – BNU in AIX – Mail facilities in AIX. 	<ul style="list-style-type: none"> • IBM Serial Optical Channel Converter.

Communications between the RISC System/6000 System and the PS/2

The RISC System/6000 system unit can communicate with the IBM PS/2 Model 70 or 80 running Version 1.2 or 1.2.1 of the IBM AIX for the Personal System/2 (AIX PS/2) licensed program. Communications to the PS/2 are through one of three types of LANs: an Ethernet Version 2; IEEE 802.3; or Token-Ring; or through an asynchronous connection. The following table lists IBM software that supports this connectivity.

Note: The Model 220 supports only TCP/IP and can communicate with the PS/2 using only an Ethernet Version 2, IEEE 802.3, or Token-Ring LAN, or an X.25 WAN.

Communications between the RISC System/6000 System and the PS/2		
Network or Connection Type	RISC System/6000 Software Offerings	PS/2 Software Offerings
Ethernet Version 2 or IEEE 802.3 LAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP application programs in AIX – Mail facilities in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program. 	<ul style="list-style-type: none"> • TCP/IP protocols in the IBM AIX PS/2 TCP/IP licensed program. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP application programs in the IBM AIX PS/2 TCP/IP licensed program – Mail facilities in AIX PS/2 – IBM AIX PS/2 X-Windows licensed program.
Token-Ring LAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP application programs in AIX – Mail facilities in AIX. 	<ul style="list-style-type: none"> • TCP/IP protocols in the IBM AIX PS/2 TCP/IP licensed program. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP application programs in the IBM AIX PS/2 TCP/IP licensed program – Mail facilities in AIX PS/2.
X.25 WAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP application programs in AIX – Mail facilities in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program. 	<ul style="list-style-type: none"> • TCP/IP protocols in the IBM AIX PS/2 TCP/IP licensed program. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP application programs in the IBM AIX PS/2 TCP/IP licensed program – Mail facilities in AIX PS/2 – IBM AIX PS/2 X-Windows licensed program.
Asynchronous connection	<ul style="list-style-type: none"> • ATE in AIX • BNU in AIX. <ul style="list-style-type: none"> – Mail facilities in AIX. 	<ul style="list-style-type: none"> • ATE in AIX PS/2 • UUCP in AIX PS/2. <ul style="list-style-type: none"> – Mail facilities in AIX PS/2.

Ethernet Connection to the PS/2

On the PS/2, the Ungermann-Bass NICps/2 Adapter 1542 supports communications over an Ethernet Version 2 or IEEE 802.3 LAN. The adapter connects to either the standard 50-ohm

(thick) coaxial cable or the standard RG-58A/U (thin) coaxial cable. Attachment to either the thick or thin coaxial cable requires an appropriate external transceiver.

Token-Ring Connection to the PS/2

On the PS/2, the IBM Token-Ring Network Adapter/A or the IBM Token-Ring Network 16/4 Adapter/A (supported only in the 4Mbps mode) support communication over a Token-Ring LAN.

X.25 WAN Connection to the PS/2

On the PS/2, the IBM X.25 Interface Co-Processor/A supports communication over an X.25 WAN.

Asynchronous Connection to a PS/2

On the PS/2, IBM provides support for asynchronous communication through the EIA-232D/V.24 interface. The following PS/2 ports and adapters support asynchronous communication:

- The standard EIA-232D port on the PS/2 system units
- IBM Dual Port Asynchronous RS-232 Adapter/A.

Communications between the RISC System/6000 System and the System/370 or System/390

The RISC System/6000 system unit can communicate with the IBM System/390 running the AIX/ESA Operating System or the TCP/IP licensed program for VM and MVS.

The following table lists a few of the IBM RISC System/6000 products that support these communications methods.

Communications between the RISC System/6000 System and the System/370 or System/390		
Network or Connection Type	RISC System/6000 Software Offerings	System/370 or System/390 Software Offerings
Ethernet Version 2 or IEEE 802.3 LAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX – TCP/IP application programs in AIX – Mail facilities in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program. – AIX 3270 Host Connection Program/6000 licensed program. • OSIMF/6000 licensed program. 	<ul style="list-style-type: none"> • TCP/IP protocols in AIX/ESA. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – Network File System support – TCP/IP application programs – Mail facilities – X-Windows client function licensed program • OSI/CS
Token-Ring LAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX – TCP/IP application programs in AIX – Mail facilities in AIX – Enhanced X-Windows in AIXwindows Environment/6000 – VM, and MVS – AIX 3270 Host Connection Program/6000 licensed program. • OSIMF/6000 licensed program. 	<ul style="list-style-type: none"> • TCP/IP protocols in AIX/ESA. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – Network File System – TCP/IP application programs – Mail facilities – X-Windows client function • OSI/CS licensed program.

Communications between the RISC System/6000 System and the System/370 or System/390		
Network or Connection Type	RISC System/6000 Software Offerings	System/370 or System/390 Software Offerings
S/370 Block Multiplexer Channel	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX – TCP/IP application programs in AIX – Mail facilities in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program – Normal mode (Channel-to-Channel) interface – Common Link Access Workstation (CLAW) interface – AIX 3270 Host Connection Program/6000 licensed program. 	<ul style="list-style-type: none"> • TCP/IP protocols in AIX/ESA. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – Network File System – TCP/IP application programs – Mail facilities – X-Windows client function – User-written AIX/ESA Application Program.
Enterprise Systems Connection (ESCON)	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX – TCP/IP application programs in AIX – Mail facilities in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program – Normal mode (Channel-to-Channel) interface – Common Link Access Workstation (CLAW) interface. – AIX 3270 Host Connection Program/6000 licensed program. 	<ul style="list-style-type: none"> • TCP/IP protocols in AIX/ESA.* The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – Network File System – TCP/IP application programs – Mail facilities – X-Windows client function – User-written AIX/ESA Application Program.

Ethernet, IEEE 802.3, or Token-Ring Connection to the System/370 or System/390

The RISC System/6000 system unit can communicate over an Ethernet Version 2 or IEEE 802.3 LAN to a channel-attached IBM 3172 Interconnect Controller or IBM 8232 Local Area Network Channel Station.

S/370 Block Multiplexer Channel Connection to the System/370 or System/390

The RISC System/6000 system unit can communicate directly to a System/370 or 390. The host views the system unit as a control unit.

ESCON Channel Connection to the System/390

The RISC System/6000 system unit can communicate directly to the System/390 ESCON channel or to the System/390 ESCON channel via the IBM 9032 or 9033 ESCON directors.

Communications between the RISC System/6000 System and Other UNIX-Based Systems

This section gives information on connecting to IBM systems other than the RISC System/6000 system unit, the IBM RT system, the IBM PS/2, and the IBM System/370. It also outlines the possible communications between the RISC System/6000 system unit and offerings from other companies. Hardware and software information pertaining to non-IBM systems should be obtained from the respective manufacturer. This section assumes the RISC System/6000 system unit is running AIX for RISC System/6000, and the non-IBM system is running a UNIX-based operating system.

Note: The Model 220 supports only TCP/IP and can communicate with a UNIX-based system using only an Ethernet Version 2, IEEE 802.3, or Token-Ring LAN, or an X.25 WAN.

Communications between the RISC System/6000 System and Other UNIX-Based Systems	
Network or Connection Type	RISC System/6000 Software Offerings
Ethernet Version 2 or IEEE 802.3 LAN	<ul style="list-style-type: none">• TCP/IP protocols in AIX. The following programs can be used with TCP/IP:<ul style="list-style-type: none">– NFS in AIX– TCP/IP application programs in AIX– BNU in AIX– Mail facilities in AIX– NCS in AIX– Enhanced X-Windows in AIXwindows Environment/6000 licensed program• OSIMF/6000 licensed program (IEEE 802.3 only).
High Performance Parallel Interface (HIPPI)	<ul style="list-style-type: none">• TCP/IP protocols in AIX. The following programs can be used with TCP/IP:<ul style="list-style-type: none">– NFS in AIX– TCP/IP application programs in AIX– BNU in AIX– Mail facilities in AIX– NCS in AIX– Enhanced X-Windows in AIXwindows Environment/6000 licensed program• IPI-3 master/slave protocols supplied with the HIPPI driver group offering can be used for performing memory-to-memory transfers, message passing, or device emulation.

Communications between the RISC System/6000 System and Other UNIX-Based Systems	
Network or Connection Type	RISC System/6000 Software Offerings
Token-Ring LAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX – TCP/IP application programs in AIX – BNU in AIX – Mail facilities in AIX – NCS in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program • OSIMF/6000 licensed program.
X.25 WAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP application programs in AIX – BNU in AIX – Mail facilities in AIX • OSIMF/6000 licensed program.
Asynchronous Connection	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP application programs in AIX – Mail facilities in AIX • BNU in AIX: <ul style="list-style-type: none"> – Mail facilities in AIX.
FDDI LAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX – TCP/IP application programs in AIX – BNU in AIX – Mail facilities in AIX – NCS in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program.

Communicating with IBM Systems Running Non-UNIX Operating Systems

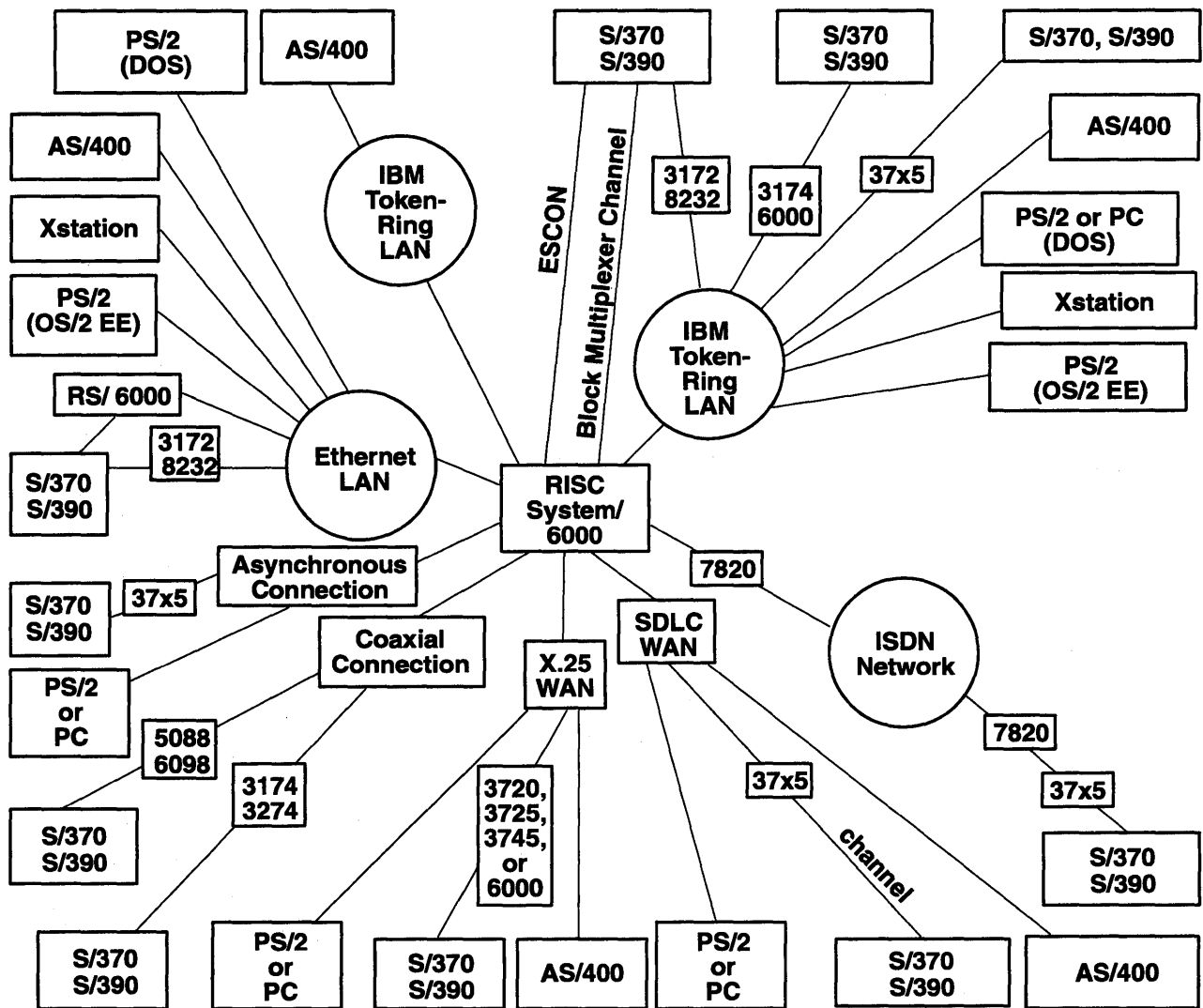
IBM offers many software and hardware products that support communications between the RISC System/6000 system unit and systems running non-UNIX-based operating systems. See the illustration on the following page for an outline of the general communications methods that these products support.

The following sections detail the methods of connectivity that IBM products provide for communications between the RISC System/6000 system unit and the following systems:

- IBM Personal System/2 (PS/2) running either Version 1.2 (or later) of the IBM Operating System/2 Extended Edition (OS/2 EE) licensed program or Version 3.3 (or later) of the IBM Disk Operating System (DOS) licensed program.
- IBM PCs running either Version 1.2 (or later) of the IBM Operating System/2 Extended Edition (OS/2 EE) licensed program or Version 3.3 (or later) of the IBM Disk Operating System (DOS) licensed program.

Throughout this section, PC refers to the IBM Personal Computer, the IBM PC XT, and the IBM Personal Computer AT.

- IBM AS/400 running the Operating System/400 (OS/400) licensed program.
- IBM System/370 or IBM System/390 running the VM, MVS, or VSE/ESA operating systems.
- IBM Xstation.



Connectivity with IBM Systems Running a Non-UNIX-Based Operating System

Note: Please refer to the tables for discussions of protocols or licensed programs used in these communications methods.

Communications between the RISC System/6000 and the IBM PS/2 or IBM PC

For most of the network and connection types mentioned in the following table, IBM offers support for PS/2s and PCs running either Version 1.2 (or later) of the IBM Operating System/2 Extended Edition (OS/2 EE) licensed program or Version 3.3 (or later) of the IBM Disk Operating System (DOS) licensed program. Throughout this section, PC refers to the IBM Personal Computer, the IBM PC XT, and the IBM Personal Computer AT.

The following table lists IBM products that support communications between the RISC System/6000 system unit and a PS/2 or PC.

Note: The Model 220 supports only TCP/IP and can communicate with a PS/2 or PC using only an Ethernet Version 2, IEEE 802.3, or Token-Ring LAN, or an X.25 WAN.

Communications between the RISC System/6000 System and a PS/2 or PC		
Network or Connection Type	RISC System/6000 Software Offerings	PS/2 and PC Software Offerings
Ethernet Version 2 or IEEE 802.3 LAN (IEEE 802.3 support is not available for PS/2 systems running DOS)	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP application programs in AIX – Mail functions in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program • DOS Server in AIX • SNA LU 6.2 protocol in AIX SNA Services/6000 licensed program. 	<ul style="list-style-type: none"> • For the DOS environment on the PS/2, the IBM Transmission Control Protocol for the PS/2 licensed program: <ul style="list-style-type: none"> – X-Windows for IBM DOS licensed program • For the DOS environment on the PS/2, the IBM AIX Access for DOS Users licensed program • For the OS/2 EE environment, the SNA support in Communications Manager included with OS/2 EE.
Token-Ring LAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP application programs in AIX – Mail functions in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program • DOS Server in AIX • SNA LU 6.2 protocol in AIX SNA Services/6000 licensed program. 	<ul style="list-style-type: none"> • For the DOS environment, the IBM Transmission Control Protocol for the PS/2 licensed program: <ul style="list-style-type: none"> – X-Windows for IBM DOS licensed program • For the DOS environment, the IBM AIX Access for DOS Users licensed program • For the DOS environment, the IBM PC SNA Support licensed program; for the OS/2 EE environment, the SNA support in Communication Manager part of OS/2 EE.

Communications between the RISC System/6000 System and a PS/2 or PC		
Network or Connection Type	RISC System/6000 Software Offerings	PS/2 and PC Software Offerings
X.25 WAN	<ul style="list-style-type: none"> • SNA LU 6.2 protocol in AIX SNA Services/6000 licensed program • OSIMF/6000 licensed program. 	<ul style="list-style-type: none"> • For the DOS environment, the IBM PC SNA Support licensed program; for the OS/2 EE environment, the SNA support in Communication Manager part of OS/2 EE. • OSI/CS licensed program.
SDLC WAN	<ul style="list-style-type: none"> • SNA LU 6.2 protocol in AIX SNA Services/6000 licensed program 	<ul style="list-style-type: none"> • For the DOS environment, the IBM PC SNA Support licensed program; for the OS/2 EE environment, the SNA support in the Communication Manager part of OS/2 EE.
Asynchronous Connection	<ul style="list-style-type: none"> • DOS Server in AIX • ATE in AIX. 	<ul style="list-style-type: none"> • For the DOS environment, the IBM AIX Access for DOS Users licensed program • For the OS/2 EE environment, the Communication Manager part of OS/2 EE.

Ethernet Connection between a RISC System/6000 System and a PS/2

For PS/2 models containing Micro Channel architecture, the Ungermann-Bass NICps/2 Adapter 1542 supports communication over an Ethernet Version 2 or IEEE 802.3 LAN. This adapter can connect to either the standard 50-ohm (thick) coaxial cable or the standard RG-58A/U (thin) coaxial cable. Attachment of this adapter to either the thick or thin coaxial cable requires an external transceiver.

Token-Ring Connection between a RISC System/6000 System and a PS/2 or PC

For the PS/2 models containing Micro Channel architecture, IBM offers the following adapters that provide support for connection to a Token-Ring LAN:

- IBM PS/2 Token-Ring Adapter/A
- IBM PS/2 Token-Ring Adapter/A 16/4.

For PCs and non-Micro Channel PS/2s, the IBM Token-Ring Network 16/4 Adapter/A provides support for connection to a Token-Ring LAN.

For PCs, the following IBM adapters support connection to a Token-Ring LAN:

- IBM Token-Ring Network PC Adapter
- IBM Token-Ring Network PC Adapter II.

X.25 Connection between a RISC System/6000 System and a PS/2 or PC

For the PS/2 models containing Micro Channel architecture, the IBM X.25 Co-Processor/2 Adapter provides hardware support for connecting to an X.25 WAN.

For PCs and non-Micro Channel PS/2s, the IBM PC X.25 Communications Adapter provides hardware support.

SDLC Connection between a RISC System/6000 System and a PS/2 or PC

For PS/2 models containing Micro Channel architecture, the IBM Personal System/2 Multi-Protocol Adapter/A provides hardware support for connecting to an SDLC WAN.

For PCs and non-Micro Channel PS/2s, the IBM SDLC Communications Adapter provides hardware support for connecting to an SDLC WAN.

Asynchronous Connection between a RISC System/6000 System and a PS/2 or PC

The following ports and adapters support asynchronous communications on the PS/2 system unit:

- The standard EIA-232D port in PS/2 system units
- IBM Dual Port Asynchronous EIA-232D Adapter/A (only for PS/2 models that contain Micro Channel architecture).

For the Personal Computer AT, the IBM Personal Computer AT Serial/Parallel Adapter provides hardware support for communicating through an asynchronous connection.

Communications between the RISC System/6000 and the AS/400

The RISC System/6000 system unit can communicate with the AS/400 running Version 1.2 of the Operating System/400 (OS/400) licensed program.

The IBM AIX AS/400 Connection Program/6000 gives the RISC System/6000 system 5250 emulation capability.

The following table lists IBM products that support communications with the AS/400.

Communications between the RISC System/6000 System and the AS/400		
Network or Connection Type	RISC System/6000 Software Offerings	AS/400 Software Offerings
Token-Ring LAN or Ethernet Version 2 or IEEE 803.3 LAN	<ul style="list-style-type: none"> • TCP/IP protocols and application functions in AIX <ul style="list-style-type: none"> – TCP/IP application programs in AIX – Mail functions in AIX • SNA LU 6.2 in AIX SNA Services/6000 licensed program • AIX AS/400 Connection Program/6000 licensed program. 	<ul style="list-style-type: none"> • TCP/IP protocols in the AS/400 TCP/IP licensed program <ul style="list-style-type: none"> – TCP/IP application programs in the AS/400 TCP/IP licensed program (ftp and ping only) – SMTP support in the OS/400 licensed program • SNA LU 6.2 in the OS/400 licensed program • AS/400 PC Support for Release 3 licensed program (for file and data transfer in a SNA environment) • AS/400 TCP/IP licensed program (for 5250 emulation in a TCP/IP environment).
SDLC WAN	<ul style="list-style-type: none"> • AIX SNA Services/6000 licensed program • AIX AS/400 Connection Program/6000 licensed program in 5250 emulation mode. 	<ul style="list-style-type: none"> • SNA LU 6.2 in the OS/400 licensed program • AS/400 PC Support for Release 3 licensed program (for file and data transfer in a SNA environment) • AS/400 TCP/IP licensed program (for 5250 emulation in a TCP/IP environment).

Ethernet LAN Connection to the AS/400

The RISC System/6000 system unit can communicate over an Ethernet Version 2 or IEEE 802.3 LAN to the AS/400 residing on an IBM Token-Ring LAN. The IBM 8209 Enhanced Ethernet Attachment Module serves as a bridge between the Ethernet Version 2 or IEEE 802.3 LAN and the IBM Token-Ring LAN.

The AS/400 Connection Program/6000 operates under TCP/IP or SNA.

Token-Ring LAN Connection to the AS/400

The RISC System/6000 system unit can communicate over an IBM Token-Ring LAN to the AS/400.

The AS/400 Connection Program/6000 operates under TCP/IP or SNA.

SDLC WAN Connection to the AS/400

The RISC System/6000 system unit can communicate over an SDLC WAN to the AS/400 through a local or remote attachment.

The AS/400 Connection Program/6000 operates under SNA.

Communications between the RISC System/6000 and the IBM System/370 or 390

The RISC System/6000 system unit can communicate with the System/370 or System/390 running the VM, MVS, or VSE/ESA operating system using the connection types listed in the following table. The table includes IBM products that support the various communications methods.

Note: The Model 220 supports only TCP/IP and can communicate with an S/370 or S/390 using only an Ethernet, IEEE 802.3, or Token-Ring LAN, or an X.25 WAN.

Communications between the RISC System/6000 System and the System/370 and System/390		
Network or Connection Type	RISC System/6000 Software Offerings	System/370 or System/390 Software Offerings
Ethernet Version 2 or IEEE 802.3 LAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX (client support only) – TCP/IP application programs in AIX (ftp, tftp, and telnet functions only) – Mail functions in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program – AIX 3270 Host Connection Program/6000 licensed program. 	<ul style="list-style-type: none"> • TCP/IP protocols in IBM TCP/IP for VM licensed program or IBM TCP/IP for MVS licensed program. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – VM/NFS feature of the VM operating system or MVS/NFS feature of the MVS operating system (server support only without the NFS Network Information Service (NIS) feature) – TCP/IP application programs in TCP/IP for VM or TCP/IP for MVS – SMTP protocol in TCP/IP for VM or TCP/IP for MVS (available for CMS and TSO users only) – X Window System (Version X.11) API (client support only) in TCP/IP for VM or TCP/IP for MVS – TCP/IP application programs in TCP/IP for VM or TCP/IP for MVS.

Communications between the RISC System/6000 System and the System/370 and System/390		
Network or Connection Type	RISC System/6000 Software Offerings	System/370 or System/390 Software Offerings
Ethernet Version 2 or IEEE 802.3 Lan (Continued)	<ul style="list-style-type: none"> • SNA protocol in AIX. The following programs can be used with SNA: <ul style="list-style-type: none"> – AIX SNA Services/6000 licensed program – AIX 3270 Host Connection Program/6000 licensed program. Supports SNA LUs 1, 2, and 3; AIX SNA Services/6000 licensed program required. • OSIMF/6000 licensed program. 	<ul style="list-style-type: none"> • System/370 or 390 network communication products: <ul style="list-style-type: none"> – ACF/VTAM Version 3.4 – ACF/NCP – For file transfer, the IND\$FILE program is also required for VM, MVS, CICS/MVS, CICS/VSE, and VSE/ESA. • OSI/CS licensed program.

Communications between the RISC System/6000 System and the System/370 or System/390		
Network or Connection Type	RISC System/6000 Software Offerings	System/370 or System/390 Software Offerings
Token-Ring LAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX (client support only) – TCP/IP application programs in AIX (ftp, ttftp, and telnet functions only) – Mail functions in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program – AIX X-Windows 3270 Emulator/6000 licensed program – AIX 3270 Host Connection Program/6000 licensed program • SNA protocol in AIX. The following programs can be used with SNA: <ul style="list-style-type: none"> – AIX SNA Services/6000 licensed program – AIX 3270 Host Connection Program/6000 licensed program. Supports SNA LUs 1, 2, and 3; AIX SNA Services/6000 licensed program required. • OSIMF/6000 licensed program. 	<ul style="list-style-type: none"> • TCP/IP protocols in IBM TCP/IP for VM licensed program or IBM TCP/IP for MVS licensed program. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – VM/NFS feature of the VM operating system or MVS/NFS feature of the MVS operating system (server support only without the NFS Yellow Pages feature) – TCP/IP application programs in TCP/IP for VM or TCP/IP for MVS – SMTP protocol in TCP/IP for VM or TCP/IP for MVS (available for CMS and TSO users only) – X Window System (Version X.11) API (client support only) in TCP/IP for VM or TCP/IP for MVS • System/370 or 390 network communication products: <ul style="list-style-type: none"> – ACF/VTAM – ACF/NCP – For file transfer, the IND\$FILE program is also required for VM, MVS, CICS/MVS, CICS/VSE, and VSE/ESA. • OSI/CS licensed program.

Communications between the RISC System/6000 System and the System/370 or System/390		
Network or Connection Type	RISC System/6000 Software Offerings	System/370 or System/390 Software Offerings
X.25 WAN	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP application programs in AIX (ftp, tftp, and telnet functions only) – Mail functions in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program – AIX 3270 Host Connection/6000 licensed program • OSIMF/6000 licensed program • SNA protocol in AIX. The following programs can be used with SNA: <ul style="list-style-type: none"> – AIX SNA Services/6000 licensed program – AIX 3270 Host Connection Program/6000 licensed program. Supports SNA LUs 1, 2, and 3; AIX SNA Services/6000 licensed program required. 	<ul style="list-style-type: none"> • TCP/IP protocols in IBM TCP/IP for VM licensed program or IBM TCP/IP for MVS licensed program. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – TCP/IP application programs in TCP/IP for VM or TCP/IP for MVS – SMTP protocol in TCP/IP for VM or TCP/IP for MVS (available for CMS and TSO users only) – X Window System (Version X.11) API (client support only) in TCP/IP for VM or TCP/IP for MVS – System/370 or 390 network communication products: <ul style="list-style-type: none"> – ACF/VTAM – ACF/NCP – For file transfer, the IND\$FILE program is also required for VM, MVS, CICS/MVS, CICS/VSE, and VSE/ESA. • OSI/Communications Subsystem for VM or OSI/Communications Subsystem for MVS, OSI/File Services for MVS and VM • Open Systems Message Exchange (OSME) licensed program • System/370 or 390 network communication products: <ul style="list-style-type: none"> – ACF/VTAM – ACF/NCP – X.25 NCP Packet-Switching Interface (NPSI). – For file transfer, the IND\$FILE program is also required for VM, MVS, CICS/MVS, and CICS/VSE.
Asynchronous connection	<ul style="list-style-type: none"> • ATE in AIX 	<ul style="list-style-type: none"> • Appropriate application software

Communication between the RISC System/6000 System and the System/370 or System/390		
Network or Connection Type	RISC System/6000 Software Offerings	System/370 or System/390 Software Offerings
SDLC WAN	<ul style="list-style-type: none"> • SNA protocol in AIX. The following programs can be used with SNA: <ul style="list-style-type: none"> – AIX SNA Services/6000 licensed program – AIX 3270 Host Connection Program/6000 licensed program. Supports SNA LUs 1, 2, and 3; AIX SNA Services/6000 licensed program required. 	<ul style="list-style-type: none"> • System/370 or 390 network communication products: <ul style="list-style-type: none"> – ACF/VTAM – ACF/NCP – For file transfer, the IND\$FILE program is also required for VM, MVS, CICS/MVS, and CICS/VSE.
ISDN WAN Using 7820	<ul style="list-style-type: none"> • SNA protocol in AIX. The following programs can be used with SNA: <ul style="list-style-type: none"> – AIX SNA Services/6000 licensed program – AIX 3270 Host Connection Program/6000 licensed program. Supports SNA LUs 1, 2, and 3; AIX SNA Services/6000 licensed program required. 	<ul style="list-style-type: none"> • System/370 or 390 network communication products: <ul style="list-style-type: none"> – ACF/VTAM – ACF/NCP – For file transfer, the IND\$FILE program is also required for VM, MVS, CICS/MVS, CICS/VSE, and VSE/ESA.

Communications between the RISC System/6000 System and the System/370 or System/390		
Network or Connection Type	RISC System/6000 Software Offerings	System/370 or System/390 Software Offerings
Block Multiplexer Channel Connection	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX (client support only) – TCP/IP application programs in AIX (ftp, tftp, and telnet functions only) – Mail functions in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program – Normal mode (channel-to-channel) interface – Common Link Access to Workstation (CLAW) – AIX 3270 Host Connection/6000 licensed program. 	<ul style="list-style-type: none"> • TCP/IP protocols for VM, MVS, and AIX/ESA. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS Support – TCP/IP application programs – SMTP protocol in TCP/IP – X Window System Support • User-written MVS, VM, or AIX/ESA Application Program.
ESCON Channel Connection	<ul style="list-style-type: none"> • TCP/IP protocols in AIX. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS in AIX (client support only) – TCP/IP application programs in AIX (ftp, tftp, and telnet functions only) – Mail functions in AIX – Enhanced X-Windows in AIXwindows Environment/6000 licensed program – AIX 3270 Host Connection/6000 licensed program – Normal Mode (Channel-to-Channel) Interface – Common Link Access Workstation (CLAW). 	<ul style="list-style-type: none"> • TCP/IP protocols for VM, MVS, and AIX/ESA. The following programs can be used with TCP/IP: <ul style="list-style-type: none"> – NFS Support – TCP/IP application programs – SMTP protocol in TCP/IP – X Window System Support – User-written MVS, VM, or AIX/ESA Application Program.
CUT connection	AIX 3278/79 Emulation/6000 licensed program	For file transfer, the IND\$FILE program is required for VM and MVS.
DFT connection	AIX 3270 Host Connection Program/6000 licensed program	For file transfer, the IND\$FILE program is required for VM, MVS, CICS/MVS, CICS/VSE, and VSE/ESA.
5088 or 6098 connection	AIX 3270 Host Connection Program/6000 licensed program	For file transfer, the IND\$FILE program is required for VM, MVS, CICS/MVS, CICS/VSE, and VSE/ESA.

Ethernet or IEEE 802.3 Connection to the System/370 or System/390

The RISC System/6000 system unit can communicate over an Ethernet Version 2 or IEEE 802.3 LAN to a locally attached IBM 3172 Interconnect Controller or IBM 8232 Local Area Network Channel Station.

Ethernet or IEEE 802.3 Connection to the System/370 or System/390 Using TCP/IP or SNA

For TCP/IP connection the RISC System/6000 system unit can use the **telnet 3270** protocol to communicate over the IBM Ethernet or IEEE 802.3 LAN to an IBM 3172 Interconnect Controller or IBM 8232 Local Area Network Channel Station.

For an SNA connection, the 3172 Interconnect Controller and VTAM V3.4 are required. For SNA LU 6.2 support, a user-provided application is required by both the RISC System/6000 system unit and the System/370 or System/390. For LU 1, 2, and 3 support, AIX 3270 Host Connection Program/6000, in conjunction with AIX SNA Services/6000, is required to communicate with the supported host environments.

Token-Ring Connection to the System/370 or System/390 Using TCP/IP or SNA

For TCP/IP connection the RISC System/6000 system unit can use the **telnet 3270** protocol to communicate over the IBM Token-Ring LAN to an IBM 3172 Interconnect Controller or IBM 8232 Local Area Network Channel Station.

For SNA LU 6.2 support a user-provided application is required by both the RISC System/6000 system unit and the System/370 or System/390. For LU 1, 2, and 3 support, AIX 3270 Host Connection Program/6000, in conjunction with AIX SNA Services/6000, is required to communicate with the supported host environments.

The RISC System/6000 system unit also can use SNA protocols to communicate over the IBM Token-Ring LAN to an IBM 3174 Subsystem Control Unit or an IBM 3725 or 3745 Communication Controller connected to the System/370 or System/390. Appropriate versions of software are required on the host.

X.25 Connection to the System/370 or System/390

The RISC System/6000 system unit can use TCP/IP or SNA protocols to communicate through an X.25 connection.

A RISC System/6000 system running OSIMF needs the AIX X.25 device driver, part of AIX for RISC System/6000, to communicate with a System/370 or System/390 running MVS or VM.

Using OSIMF, the RISC System/6000 system unit can communicate with the System/370 or System/390 through an X.25 connection by way of the following devices:

- IBM 3720 Communication Controller
- IBM 3725 or 3745 Communication Controller.

The communications controller must have support for the NCP packet-switching interface (NPSI).

SDLC Connection to the System/370 or System/390

For LU 6.2 support a user-provided application is required by both the RISC System/6000 system unit and the System/370 or System/390. For LU 1, 2, and 3 support, AIX 3270 Host Connection Program/6000, in conjunction with AIX SNA Services/6000, is required to communicate with the supported host environments.

The RISC System/6000 system unit can use SNA protocols to communicate over an SDLC WAN to an IBM 3705, 3725, or 3745 Communication Controller or an IBM 3174 Subsystem Control Unit. Appropriate versions of software are required on the host.

CUT Coaxial Connection to the System/370 or System/390

The RISC System/6000 system unit can communicate with the System/370 or System/390 through a CUT coaxial connection by way of the following devices:

- IBM 3174 Display Control Unit
- IBM 3274 Display Control Unit
- IBM 4331 or 4361 Integrated Work Station Adapter
- IBM 4331 or 4361 Integrated Display/Printer Adapter.

DFT Coaxial Connection to the System/370 or 390

The RISC System/6000 system unit can communicate with the System/370 or System/390 through a DFT coaxial connection by way of the following devices:

- IBM 3174 Display Control Unit
- IBM 3274 Display Control Unit
- IBM 4331 or 4361 Integrated Work Station Adapter
- IBM 9370 Work Station Subsystem Controller.

For non-SNA mode, both display and host-addressable printer sessions are supported. For SNA mode, only display sessions are supported.

5088 or 6098 Connection to the System/370 or System/390

The RISC System/6000 system unit can communicate with the System/370 or System/390 through the IBM 5088 or IBM 6098 Graphics Control Unit. The graphics control unit can be locally or remotely connected to the System/370 or System/390. Only non-SNA mode is supported.

Block Multiplexer Channel Connection to the System/370 or System/390

The RISC System/6000 system unit can communicate directly with a System/370 or System/390 through the Block Multiplexer Channel. The host views the RISC System/6000 as a 3088 control unit.

The RISC System/6000 can connect to an IBM 3044 Model 2 Channel Extender, which allows the 370 parallel channel to be extended up to 3 km (1.9 miles). It can also connect to an IBM 9034 Model 1 ESCON Converter, allowing communications with a System/370 or System/390 ESCON channel. Although the distance between the system unit and the 9034 cannot exceed 122 m (400 ft), there can be up to 3 km (1.9 miles) between the 9034 and the host.

ESCON Channel Connection to the System/370 or System/390

The RISC System/6000 can communicate with the System/390 through the ESCON Channel. The System/390 views the RISC System/6000 as a 3088 control unit. The RISC System/6000 ESCON Adapter can also connect to the IBM 9032 or 9033 ESCON directors.

Communications between the RISC System/6000 and an IBM Xstation

The RISC System/6000 system unit can communicate with an Xstation 120 through an Ethernet Version 2, IEEE 802.3, or Token-Ring LAN. The system unit can communicate with an Xstation 130 through an Ethernet Version 2, IEEE 802.3, or Token-Ring LAN, or Serial Line Internet Protocol (SLIP). An Xstation can boot across bridges and gateways.

The Xstation 130 can serve as either an X terminal or as a serially-attached ASCII terminal. Once booted as an X terminal, the Xstation cannot function as an ASCII terminal.

Software Support for Communications with an Xstation

In order to communicate with an Xstation, the RISC System/6000 system unit requires the following software:

- IBM AIX Version 3 for RISC System/6000 licensed program
- TCP/IP component of the AIX for RISC System/6000 licensed program
- IBM AIXwindows Environment/6000 licensed program
- IBM AIX Xstation Manager/6000 licensed program.

Hardware Support for Communications with an Xstation

For an Ethernet Version 2 or IEEE 802.3 connection, the Xstation comes standard with one Ethernet Version 2/IEEE 802.3 port. This port can connect to either the standard 50-ohm (thick) coaxial cable or the standard RG-58A/U (thin) coaxial cable.

For a Token-Ring connection, an Xstation can use the IBM Token-Ring Network 16/4 Adapter/A (available optionally).

For SLIP support, the Xstation comes standard with a serial port supporting speeds of 110 to 19200 bps.

Communications with Attached ASCII Terminals

The RISC System/6000 system unit supports communications with locally attached ASCII terminals defined to AIX for RISC System/6000 by way of the **terminfo** file. A RISC System/6000 system unit can communicate with IBM 3101, IBM 3151, IBM 3161, IBM 3162, IBM 3163, and IBM 3164 ASCII terminals and with other devices that can emulate an IBM 3101 or IBM 3161. In addition, a RISC System/6000 system unit can communicate with non-IBM terminals that meet the ANSI X3.64 standard including: the DEC VT 100 and VT 220; and the WYSE 30 and 50.

Software Support for Communications with ASCII Terminals

The AIX for RISC System/6000 licensed program includes software that allows communications with supported ASCII terminals.

Hardware Support for Communications with ASCII Terminals

The following ports and adapters support communications with ASCII terminals:

- The two standard EIA-232D ports in each RISC System/6000 system unit
- IBM 8-Port Async Adapter-EIA-232 with the IBM Multiport Interface Cable
- IBM 8-Port Async Adapter-EIA-422A with the IBM Multiport Interface Cable
- IBM 8-Port Async Adapter-MIL-STD 188 with the IBM Multiport Interface Cable
- IBM 16-Port Async Adapter-EIA-232 with the 16-Port Interface Cable-EIA-232
- IBM 16-Port Async Adapter-EIA-422A with the IBM 16-Port Interface Cable-EIA-422A
- IBM 128-Port Async Controller with the IBM Remote Async Nodes.

Some terminals can use both EIA-232D and EIA-422A interfaces, while others can use only the EIA-232D interface.

Chapter 4. Documentation Overview

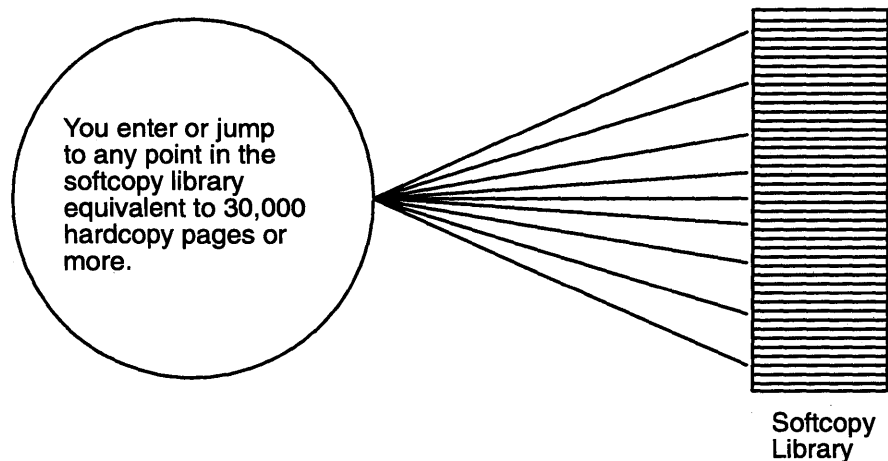
This chapter discusses concepts involving softcopy information in the *Hypertext Information Base Library* and describes the contents of the library.

Hypertext Information Base Library: Overview

Nearly all the information necessary to support the operating system and many other licensed programs is available in softcopy as well as a conventional hardcopy library. Using the softcopy library, you can find information about using the system without having to search through the hardcopy library.

Softcopy Information in Hypertext Format

The softcopy library is available in a form that uses hypertext information-access techniques. Information can be viewed on display devices and selectively printed by the users. The hypertext medium enables you to see any part of the more than 30,000-page information database rapidly, using a variety of specialized retrievability techniques as shown in the following figure:



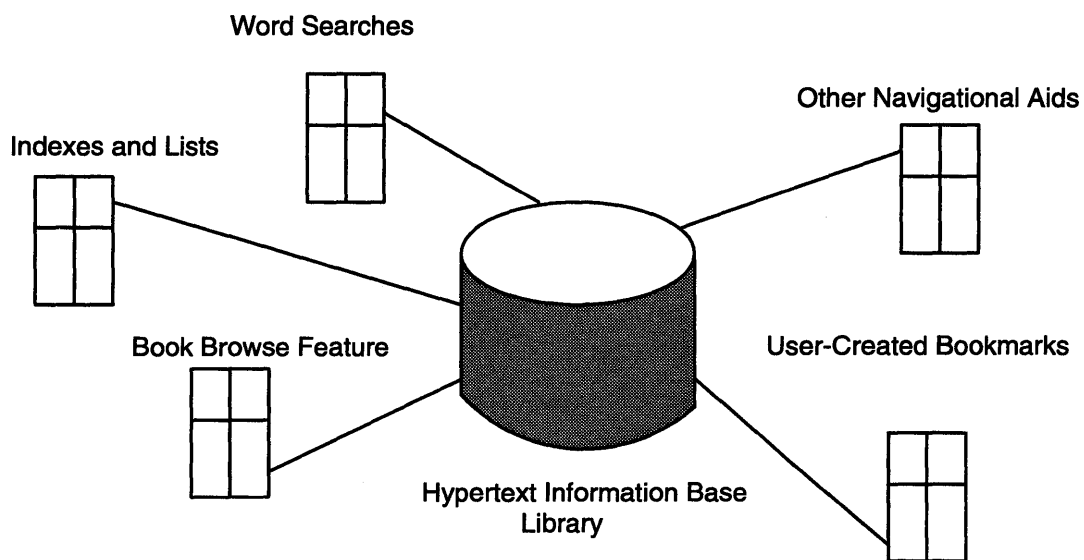
The hypertext medium enables you to arrive at any point within the softcopy database rapidly.

Hypertext Retrievability Tool (InfoExplorer)

Hypertext retrievability is provided through the InfoExplorer Program. The InfoExplorer Program allows you to retrieve information on either ASCII terminals or within a window interface. Hypertext simulates many of the ways you handle hardcopy information and provides you with rapid cross-referencing to the information they need. You can locate information by using such techniques as the following:

- Linking to the information they need from a topic and task index
- Executing a word search through the entire library or a portion of the library
- Using a title search
- Using traditional book-like tables of contents
- Using the book browse feature
- Using bookmarks
- Linking to information from the alphabetical lists of commands and programming information

The hypertext medium provides a variety of information-access techniques to enable you to access information rapidly as shown in the following figure:



Information-access techniques in the hypertext medium.

Advantages of Hypertext

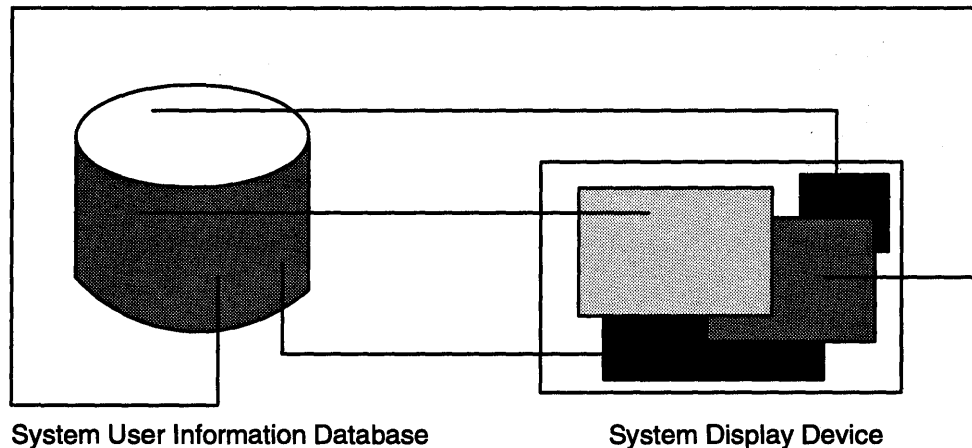
Hypertext offers several advantages such as more accurate information access, multiple windows for viewing information, and elimination large hardcopy libraries.

More accurate information access. Conventional hardcopy libraries are composed of books that are collections of guide, concept, and reference information. To use this form of information, you must be able to choose the right book and the right section within the book. With softcopy information, you struggle less to determine the right book, and the right section within the book, in which to locate your information.

Multiple windows for information views. In the window interface, you can view the documentation in multiple windows and thus simulate the traditional hardcopy scenario of

having several books open at the same time. For example, if you are following procedures in a guide article and need additional information on a command, you can see both the guide article and the command article in separate windows on the same screen.

By running softcopy information in several windows, you can view the documentation at different points simultaneously as seen in the following figure:



Viewing documentation at different points simultaneously.

Elimination of physical effort with hardcopy information. One of the greatest advantages of softcopy is the elimination of the physical size and inconvenience of the bulky 30,000-page hardcopy library. In such a large library, simple tasks such as finding a space large enough to store the volumes and handling several volumes at once are challenges. These problems are eliminated by reducing the size of the library to that of a single compact disc.

For more information about the InfoExplorer program, see "A New Way of Looking at Documentation" in *AIX Version 3.2 Getting Started*.

Hypertext Linking Considerations

The softcopy library consists of a number of databases, which are packaged as subsets and shipped with various licensed programs. Because of hypertext links back and forth among these databases, anytime you update a subset of your softcopy library, you must also order and install replacements for any other subsets that you use. Contact your sales representative for more information.

Hypertext Information Base Library Content

The *Hypertext Information Base Library* for use with InfoExplorer is divided into several databases. One or more databases can be shipped with a licensed program as shown below. The entire library is also optionally available on a CD-ROM disc as *AIX and RISC System/6000 Hypertext Information Base Library*. For additional information on updating databases you have installed, see "Hypertext Linking Considerations" on page 4-3. The following table lists the databases in the library, gives a brief description of database contents, and shows the approximate size of each database:

Data-base	Description	Shipped With	Size in M-Bytes
nav	Navigation for the entire <i>Hypertext Information Base Library</i> , <i>AIX Messages Reference</i> , and <i>Documentation Overview</i>	AIX	14
aix	Using and managing guides and references for AIX and AIXwindows Environment/6000	AIX	57
aix2	Using and managing guides and references for several licensed programs	AIX	27
prog	Programming guides and references for AIX and several other licensed programs	AIX	36
graph	Graphics Programming guides and references for Graphics Library (GL) and OpenGL	AIXwindows Environment/6000	10
graph2	Graphics programming guides and references for AIX graPHIGS and PEXlib	AIXwindows Environment/6000	26
uiprog	User interface programming guides and references	AIXwindows Environment/6000	28
hardware	Hardware and keyboard technical references	Available on optional CD-ROM only	19
ada	Ada guide and reference	AIX Ada/6000	8
assemb	<i>Assembler Language Reference</i>	AIX	6
dce	DCE guides and references	AIX DCE	26
encina	Encina using, managing and programming guides and references	Encina for AIX/6000	18
update	Interim updates (to support selective fix; not available on CD-ROM)	Selective Fixes	1
aixmin	SMIT help files (to support SMIT help before the aix database is installed; not available on CD-ROM)	AIX	2
help	InfoExplorer help files (for use with InfoCrafter only; not available on CD-ROM)	AIX	2

Database Content

This section shows the audience for each database, the type of information in each database, and the licensed programs or program products documented in each database.

Navigation

The navigation database (nav) contains navigational aids to help you find information in the library, help for understanding system error messages, and help for using and managing the InfoExplorer program. Navigation articles include a topic and task index, an alphabetical and functional index to system commands, an alphabetical and topical index to programming reference, and book-content lists to help you find information in a book-like manner. Navigation is provided to documentation for the following licensed programs:

- AIX Version 3 for RISC System/6000
- AIXwindows Environment/6000
- PC Simulator/6000
- AIX 3270 Host Connection Program/6000
- AIX 3278/79 Emulation/6000
- NetWare for AIX/6000
- AIX Network Management/6000
- Xstation Manager/6000
- The Distributed Computing Environment for AIX/6000 family of products
- The Encina for AIX/6000 family of products
- AIX Ada Compiler/6000
- Ada Runtime Environment/6000
- InfoCrafter/6000
- Ultimedia Services/6000

Using and Managing

The using and managing databases (aix and aix2) contain documentation for configuring, customizing, and using the following licensed programs and software products:

- AIX
- AIXwindows Environment/6000
- 3270 Host Connection Program/6000
- AIX 3278/79 Emulation/6000
- NetWare for AIX/6000
- Xstation Manager/6000
- InfoCrafter/InfoCrafter/6000
- AIX Network Management/6000
- PC Simulator/6000
- Ultimedia Services/6000

The information in the aix database is also available in the following books:

- *AIX Version 3.2 Installation Guide*
- *AIX Version 3.2 Getting Started*
- *AIX Version 3.2 System User's Guide: Operating System and Devices*
- *AIX Version 3.2 System Management Guide: Operating System and Devices*
- *AIX Version 3.2 Commands Reference* (all volumes)
- *AIX Version 3.2 Files Reference*
- *AIX Version 3.2 Editing Concepts and Procedures*
- *AIX Version 3.2 System User's Guide: Communications and Networks*
- *AIX Version 3.2 System Management Guide: Communications and Networks*
- *AIX Version 3.2 Diskless Workstation Management Guide*
- *AIX Version 3.2 Performance Monitoring and Tuning Guide*
- *AIX Version 3.2 Problem Solving Guide and Reference*
- *AIX Version 3.2 Topic Index and Glossary* (glossary part)
- *AIX Version 3.2 Text Formatting Reference*
- *AIX Version 3.2 Remote Services User's Guide*
- *AIXwindows Environment/6000 Version 1.2 Desktop User's Guide*

The information in the aix2 database is also available in the following books:

- *AIX InfoCrafter/6000 Version 1.1 User's Guide and Reference*
- *AIX Ultimedia Services/6000 Guide and Reference*
- *AIX Version 3.2 M-Video Capture Adapter: Device Driver and Sample Programs*
- *AIX Version 3.2 Block Multiplexer Channel Adapter: User's Guide and Service Information*
- *AIX Version 3.2 Enterprise Systems Connection Adapter: User's Guide and Service Information*
- *Host Connection Program/6000 Guide and Reference*
- *NetWare for AIX/6000 from IBM v3.11 Installation Guide*
- *NetWare for AIX/6000 from IBM v3.11 User Basics*
- *NetWare for AIX/6000 from IBM v3.11 Concepts Guide*
- *NetWare for AIX/6000 from IBM v3.11 System Administration Guide*
- *NetWare for AIX/6000 from IBM v3.11 System Messages*
- *NetWare for AIX/6000 from IBM v3.11 Utilities Reference*
- *NetWare for AIX/6000 from IBM v3.11 Printer Server Reference*
- *Xstation Manager/6000 Version 1.4.1 System Management Guide*
- *Personal Computer Simulator/6000 Guide and Reference*

Programming

The programming database (prog) contains programming reference and guides for application and system programmers. The database includes information for the following licensed programs and software products:

- AIX
- AIX XL C Compiler/6000 (part of AIX)
- 3270 Host Connection Program/6000
- Network Management

The information in the prog database is also available in the following books:

- *AIX Version 3.2 General Programming Concepts*
- *AIX Version 3.2 Kernel Extensions and Device Support Programming Concepts*
- *AIX Version 3.2 Communications Programming Concepts*
- *AIX Version 3.2 Technical Reference, Volume 1: Base Operating System and Extensions*
- *AIX Version 3.2 Technical Reference, Volume 2: Base Operating System and Extensions*
- *AIX Version 3.2 Technical Reference, Volume 3: Communications*
- *AIX Version 3.2 Technical Reference, Volume 4: Kernel and Subsystems*
- *AIX Version 3.2 Technical Reference, Volume 5: Kernel and Subsystems*
- *AIX Version 3.2 for RISC System/6000 XL C User's Guide*
- *AIX Version 3.2 for RISC System/6000 XL C Language Reference*

Programming Graphics

The programming graphics databases (graph and graph2) contain programming reference and guide documentation for application and system programmers. The databases include documentation for the following licensed programs and software products:

- AIXwindows Environment/6000, AIXwindows/3D feature:
 - Graphics Library (GL)
 - OpenGL
 - graPHIGS
 - PEXlib

The information in the graph database is also available in the following books:

- *AIX Version 3.2 Graphics Library (GL) Programming Concepts*
- *AIX Version 3.2 Technical Reference, Volume 9: Graphics Library*
- *OpenGL Reference Manual: The Official Reference Document for OpenGL, Release 1*

The information in the graph2 database is also available in the following books:

- *The graPHIGS Programming Interface: Getting Started*
- *The graPHIGS Programming Interface: Understanding Concepts*
- *The graPHIGS Programming Interface: Customization and Problem Diagnosis*
- *The graPHIGS Programming Interface: Messages and Codes*
- *The graPHIGS Programming Interface: Technical Reference*
- *The graPHIGS Programming Interface: Subroutine Reference*

User Interface Programming

The user interface programming database (uipro) contains information for application programmers who create graphical interfaces. The database includes documentation for AIXwindows Environment/6000. The information in the user interface programming database is also available in the following books:

- *AIX Version 3.2 User Interface Programming Concepts: AIXwindows and Enhanced X-Windows, Volume 1*
- *AIX Version 3.2 Technical Reference, Volume 6: User Interface*
- *AIX Version 3.2 Technical Reference, Volume 7: User Interface*
- *AIX Version 3.2 Technical Reference, Volume 8: User Interface*

Ada

The Ada database (ada) contains documentation for AIX Ada Compiler/6000 and AIX Ada Run Time Environment/6000. The information in the ada database is also available in the following books:

- *Ada User's Guide*
- *Ada Language Reference*
- *Support Package Reference for Ada*

Assembler

The Assembler database (assemb) contains documentation for AIX Assembler. The information in the assembler database is also available in *AIX Version 3.2 Assembler Language Reference*.

DCE

The DCE database (dce) contains documentation for AIX Distributed Computing Environment (DCE). The information in the dce database is available in the following books:

- *AIX Distributed Computing Environment/6000 Overview*
- *AIX Distributed Computing Environment/6000 Administration Guide*
- *AIX Distributed Computing Environment Global Directory Services/6000 Administration Guide and Reference*
- *Introduction to OSF DCE*
- *OSF DCE User's Guide and Reference*
- *OSF DCE Administration Reference*
- *OSF DCE Application Development Guide*
- *OSF DCE Application Development Reference*

Encina

The Encina database (encina) contains documentation for Encina for AIX/6000. The information in the encina database is also available in the following books:

- *Encina for AIX/6000 Product Family Overview*
- *Encina for AIX/6000 Application Development Guide*
- *Encina for AIX/6000 Base Reference*
- *Encina for AIX/6000 Transactional-C Programmer's Guide and Reference*
- *Encina for AIX/6000 Server Reference*
- *Encina Server for AIX/6000 Administration: System Administrator's Guide and Reference*
- *Encina for AIX/6000 Server Administration: Programmer's Guide and Reference*
- *Encina for AIX/6000 SFS Administrator's Guide and Reference*
- *Encina for AIX/6000 SFS Programmer's Guide and Reference*
- *Encina for AIX/6000 ISAM Implementation and Extensions Guide*
- *Encina for AIX/6000 Monitor Administrator's Guide and Reference*
- *Encina for AIX/6000 Monitor Programmer's Guide and Reference*

- *Encina for AIX/6000 PPC System Administrator's Guide and Reference*
- *Encina for AIX/6000 PPC Executive Programmer's Reference*

Hardware

The hardware database (hardware) contains system hardware technical reference and keyboard technical reference. The information in the hardware database is also available in the following books:

- *AIX Version 3.2 Technical Reference, Volume 10: Keyboard*
- *7011 POWERstation and POWERserver Hardware Technical Information*
- *7012 POWERstation and POWERserver Models 34x, 35x, 36x, and 37x Hardware Technical Information*
- *7013 POWERstation and POWERserver Models 550L, 57x, 58x, 58H, and 590 Hardware Technical Information*
- *7015 POWERserver Models 97x, 98x, and 99x Hardware Technical Information*
- *POWERstation and POWERserver Hardware Technical Information-General Architectures*
- *POWERstation and POWERserver Hardware Technical Information-Options and Devices*

Update

The update database (update) contains information to support selective fixes. If you receive a selective fix, you may receive this database on diskette. When installed, the **Update** button will appear in the InfoExplorer navigation window or screen.

SMIT Help

The SMIT help database (aixmin) provides SMIT help during AIX installation, and before the aix database is installed. When the aix database is installed, the SMIT help database is no longer used.

InfoExplorer Help

The infoExplorer help database (help) contains online help for InfoExplorer. The help database is for use with user-created libraries using the InfoCrafter licensed program. This allows InfoCrafter users to provide online InfoExplorer help with their own library. InfoExplorer users reading libraries created by InfoCrafter users need this information to understand the functions of the InfoExplorer program. There are no hypertext links out of this database. In the *Hypertext Information Base Library*, the help information is contained in the nav database with hypertext links to other information in the library.

Summary of Available Documentation

The following sections list available RISC System/6000 and AIX documentation. You can order IBM publications from your IBM sales representative or, in the U.S., from IBM Customer Publications Support at 1 800 879-2755. If you believe you are entitled to publications that were not shipped with your RISC System/6000 or AIX purchases, contact your IBM sales representative or Customer Publications Support for assistance.

Common System-Level Guides and Reference Documentation

The following documentation contains general information about hardware and software offerings:

Order Number	Title
G326-0222	<i>RISC System/6000 Direct Order Catalog</i>
GC67-0210	<i>AIX Family Catalog</i>
G320-1244	<i>Skill Dynamics Catalog of Education</i>
GC23-2406	<i>IBM RISC System/6000 System Overview</i>
GC23-2407	<i>IBM RISC System/6000 Planning for Your System Installation</i>
SC23-2456	<i>AIX/6000 Version 3.2 and RISC System/6000 Documentation Overview</i>
GC23-2201	<i>AIX Version 3.2 Topic Index and Glossary</i>
SC23-2163	<i>AIX and RISC System/6000 Hypertext Information Base Library</i>
SC23-2204	<i>AIX Version 3.2 Problem Solving Guide and Reference</i>
SC23-2530	<i>AIX Version 3.2 Messages Guide and Reference</i>
SA23-2687	<i>POWERstation and POWERserver Common Diagnostics and Service Guide</i>
SC23-2454	<i>AIX Version 3.2 Remote Services User's Guide</i>
SA23-2690	<i>RISC System/6000 Customer Support Information</i>

System Unit Documentation

The following section identifies documentation that describes installation and usage of these system units and devices:

- 7008 POWERstation
- 7011 POWERstation and POWERserver
- 7012 POWERstation and POWERserver
- 7013 POWERstation and POWERserver
- 7015 POWERstation and POWERserver
- 9333 High-Performance Disk Drive Subsystem
- 9334 SCSI Expansion Unit
- 9348 Tape Unit Drawer

Order Number	Title
SA23-2682	<i>7008 POWERstation Setup and Operator Guide</i>
SA23-2683	<i>7008 POWERstation Service Guide</i>
SA23-2664	<i>7011 POWERstation and POWERserver Setup and Operator Guide</i>

SA23-2681	<i>7011 POWERstation and POWERserver Customer Setup Guide Quick Start</i>
SA23-2665	<i>7011 POWERstation and POWERserver Service Guide</i>
SA23-2623	<i>7012 POWERstation and POWERserver Operator Guide</i>
SA23-2624	<i>7012 POWERstation and POWERserver Installation and Service Guide</i>
SA23-2691	<i>7012 POWERstation and POWERserver Supplemental Information for 7012 Environmentally Hardened Models 34H, 360, and 370</i>
SA23-2621	<i>7013 POWERstation and POWERserver Operator Guide</i>
SA23-2622	<i>7013 POWERstation and POWERserver Installation and Service Guide</i>
SA23-2627	<i>7015 POWERserver Operator Guide</i>
SA23-2628	<i>7015 POWERserver Installation and Service Guide</i>
SA23-2649	<i>7015 POWERserver CPU Drawer Service Guide</i>
SA23-2677	<i>7015 POWERserver CPU Enclosure Service Guide</i>
SY33-0160	<i>7015 POWERserver SCSI Drawers Installation and Service Guide</i>
SA23-2651	<i>7015 POWERserver Async Expansion Drawer Service Guide</i>
SA23-2692	<i>7015 POWERserver Models 970B and 980B CPU-Media Enclosure Service Guide</i>
SA23-2697	<i>7015 POWERserver Model 990 CPU-Media Enclosure Service Guide</i>
GA33-3208	<i>9333 Model 010 and 011 High-Performance Disk-Drive Subsystem Operator Guide</i>
SY33-0161	<i>9333 Model 010 and 011 High-Performance Disk-Drive Subsystem Installation and Service Guide</i>
GA33-3232	<i>9334 SCSI Expansion Units Operator Guide</i>
SY33-0165	<i>9334 Models 010 and 011 SCSI Expansion Units Installation and Service Guide</i>
SY31-0711	<i>9348 Installation Guide</i>
SA21-9567	<i>9348 Customer Information</i>
SY31-0697	<i>9348 Service Information</i>
SA23-2629	<i>POWERstation and POWERserver Service Request Number Cross-Reference</i>

Externally Attached Device Documentation

The following section identifies documentation that describes installation, usage, and technical aspects for these devices:

- 7010 Xstation
- 7135 RAIDiant Array
- 7202 Expansion Rack
- 7203 External Portable Disk Drive
- 7204 External Disk Drive
- 7206 2.0GB External 4mm Tape Drive
- 7207 1/4-Inch Tape Drive
- 7208 2.3GB External 8mm Tape Drive
- 7210 CD-ROM Drive
- 7235 POWER GTO
- 9333 High-Performance Disk Drive Subsystem
- 9334 SCSI Expansion Unit
- 9348 Tape Unit Drawer

Order Number	Title
GA33-3251	<i>7135 RAIDiant Array: Operator Guide</i>
SY33-0181	<i>7135 RAIDiant Array: Installation and Service Guide</i>
GA33-3253	<i>7135 RAIDiant Array Deskside Mini-Rack: Operator Guide</i>
SY33-0182	<i>7135 RAIDiant Array Deskside Mini-Rack: Installation and Service Guide</i>
SA23-2656	<i>Xstation 120 Setup and Operator Guide</i>
SA23-2657	<i>Xstation 120 Service Guide</i>
SA23-2635	<i>Xstation 130 Setup and Operator Guide</i>
SA23-2636	<i>Xstation 130 Service Guide</i>
SA23-2703	<i>7010 Xstation Model 140 Setup, Operator, and Service Guide</i>
SA23-2695	<i>7010 Xstation Model 150 Setup, Operator, and Service Guide</i>
SA23-2669	<i>7202 Expansion Rack Operator Guide</i>
SA23-2670	<i>7202 Expansion Rack Installation and Service Guide</i>
SA23-2633	<i>7203 External Portable Disk Drive Model 001 Setup and Operator Guide</i>
SA23-2634	<i>7203 External Portable Disk Drive Model 001 Service Guide</i>
SA23-2658	<i>7204 External Disk Drive Models 001 and 320 Setup and Operator Guide</i>
SA23-2659	<i>7204 External Disk Drive Model 001 and 320 Service Guide</i>
SA26-7004	<i>7206 2.0GB External 4mm Tape Drive (Model 001) Installation Guide</i>
SA26-7005	<i>7206 2.0GB External 4mm Tape Drive (Model 001) Operator Guide</i>
SA26-7006	<i>7206 2.0GB External 4mm Tape Drive (Model 001) Service Guide</i>
SA23-2641	<i>7207 1/4-Inch Tape Drive Setup and Operator Guide</i>
SA23-2642	<i>7207 1/4-Inch Tape Drive Service Guide</i>

SA23-2639	<i>7208 2.3GB External 8mm Tape Drive Model 001 Setup and Operator Guide</i>
SA23-2640	<i>7208 2.3GB External 8mm Tape Drive Model 001 Service Guide</i>
SA26-7000	<i>7208 5.0GB External 8mm Tape Drive Model 011 Installation Guide</i>
SA26-7001	<i>7208 5.0GB External 8mm Tape Drive Model 011 Operator Guide</i>
SA26-7002	<i>7208 5.0GB External 8mm Tape Drive Model 011 Service Guide</i>
SA23-2637	<i>7210 CD-ROM Drive Setup and Operator Guide</i>
SA23-2638	<i>7210 CD-ROM Drive Service Guide</i>
SA23-2705	<i>7210 CD-ROM Drive Model 005 Setup and Operator Guide</i>
SA23-2706	<i>7210 CD-ROM Drive Model 005 Service Guide</i>
SA23-2125	<i>Introducing the 7235 POWER GTO</i>
SY66-0210	<i>7235 POWER GTO Installation and Service Guide</i>
GA33-3234	<i>9333 Model 500 and 501 High-Performance Disk-Drive Subsystem Operator Guide</i>
SY33-0168	<i>9333 Model 500 and 501 High-Performance Disk-Drive Subsystem Installation and Service Guide</i>
GA33-3232	<i>9334 SCSI Expansion Units Operator Guide</i>
SY33-0167	<i>9334 Models 500 and 501 SCSI Expansion Units Installation and Service Guide</i>
SY31-0711	<i>9348 Installation Guide</i>
SA21-9567	<i>9348 Customer Information</i>
SY31-0697	<i>9348 Service Information</i>

Hardware Feature Documentation

The following documentation provides information about hardware special features:

Order Number	Title
GA23-2063	<i>5080 Graphics System Installation, Operation, and Problem Determination</i>
SC23-2427	<i>AIX Version 3.2 Block Multiplexer Channel Adapter: User's Guide and Service Information</i>
SA23-2696	<i>POWERstation and POWERserver S/370 Channel Emulator/A User's Guide and Service Information</i>
SN32-9037	<i>POWERstation and POWERserver Supplement for S/370 Channel Emulator/A User's Guide and Service Information</i>
SC23-2474	<i>AIX Version 3.2 Enterprise Systems Connection Adapter: User's Guide and Service Information</i>
SA23-2689	<i>MultiPort/2 Co-Processor Adapter for RISC System/6000 Installation and Service Guide</i>
SA23-2688	<i>PortMaster Co-Processor Adapter for RISC System/6000 Installation and Service Guide</i>

Hardware Technical Reference Documentation

The following documentation describes system units and devices in detail. This documentation includes diagrams and descriptions of the system units and their features, such as processor boards, input/output boards, operator panels, and connectors.

Order Number	Title
SA23-2643	<i>POWERstation and POWERserver Hardware Technical Information-General Architectures</i>
SA23-2646	<i>POWERstation and POWERserver Hardware Technical Information-Options and Devices</i>
SR28-5124	<i>PowerPC Architecture</i>
S84F-9808	<i>Personal System/2 Hardware Interface Technical Reference: Architectures</i>
SA23-2647	<i>Hardware Technical Reference - Micro Channel Architecture</i>
SA23-2666	<i>7011 POWERstation and POWERserver Hardware Technical Information</i>
SA23-2660	<i>7012 POWERstation and POWERserver Hardware Technical Information</i>
SA23-2680	<i>7012 POWERstation and POWERserver Models 34x, 35x, 36x, and 37x Hardware Technical Information</i>
SA23-2644	<i>7013 and 7016 POWERstation and POWERserver Hardware Technical Reference</i>
SA23-2684	<i>7013 POWERstation and POWERserver Models 550L, 57x, 58x, 58H, and 590 Hardware Technical Information</i>
SA23-2645	<i>7015 POWERserver Hardware Technical Reference</i>
SA23-2686	<i>7015 POWERserver Models 97x, 98x, and 99x Hardware Technical Information</i>
SA33-3207	<i>7015 SCSI Drawers: Technical Reference</i>
SA23-2672	<i>7018 POWERserver Model 770 and 771 Hardware Technical Information</i>
SA33-3252	<i>7135 RAIDiant Array: Hardware Technical Information</i>
SA33-3254	<i>7135 RAIDiant Array Deskside Mini-Rack: Hardware Technical Information</i>
SA33-3209	<i>9333 Model 010 and 011 High-Performance Disk-Drive Subsystem Hardware Technical Information</i>
SA33-3235	<i>9333 Model 500 and 501 High-Performance Disk-Drive Subsystem Hardware Technical Information</i>
SA33-3231	<i>9334 Models 010 and 011 SCSI Expansion Units Technical Reference Information</i>
SA33-3233	<i>9334 Models 500 and 501 SCSI Expansion Units Technical Reference Information</i>
SA23-2661	<i>Xstation 120 Hardware Technical Reference</i>
SA23-2648	<i>Xstation 130 Hardware Technical Reference</i>

General Software Documentation

The following list identifies documentation that provides information about features available through a variety of AIX applications:

Order Number	Title
SC23-2341	<i>AIX Version 3.2 Installation Guide</i>
GC23-2521	<i>AIX Version 3.2 Getting Started</i>
GC23-2522	<i>AIX Version 3.2 System User's Guide: Operating System and Devices</i>
GC23-2486	<i>AIX Version 3.2 System Management Guide: Operating System and Devices</i>
SC23-2401	<i>AIX Version 3.2 Quick Reference</i>
SC23-2365	<i>AIX Version 3.2 Performance Monitoring and Tuning Guide</i>
GC23-2212	<i>AIX Version 3.2 Editing Concepts and Procedures</i>
GBOF-1802	<i>AIX Version 3.2 Commands Reference (all volumes)</i>
GC23-2376	<i>AIX Version 3.2 Commands Reference, Volume 1 (commands ac through dumpfs)</i>
GC23-2366	<i>AIX Version 3.2 Commands Reference, Volume 2 (commands e through lvlstmajor)</i>
GC23-2367	<i>AIX Version 3.2 Commands Reference, Volume 3 (commands m4 through rwhod)</i>
GC23-2393	<i>AIX Version 3.2 Commands Reference, Volume 4 (commands sa through ypxf4)</i>
GC23-2200	<i>AIX Version 3.2 Files Reference</i>
SBOF-1539	<i>AIX Version 3.2 Technical Reference (all volumes)</i>
SC23-2382	<i>AIX Version 3.2 Technical Reference, Volume 1: Base Operating System and Extensions</i>
SC23-2383	<i>AIX Version 3.2 Technical Reference, Volume 2: Base Operating System and Extensions</i>
SC23-2384	<i>AIX Version 3.2 Technical Reference, Volume 3: Communications</i>
SC23-2385	<i>AIX Version 3.2 Technical Reference, Volume 4: Kernel and Subsystems</i>
SC23-2386	<i>AIX Version 3.2 Technical Reference, Volume 5: Kernel and Subsystems</i>
SC23-2387	<i>AIX Version 3.2 Technical Reference, Volume 6: User Interface</i>
SC23-2388	<i>AIX Version 3.2 Technical Reference, Volume 7: User Interface</i>
SC23-2389	<i>AIX Version 3.2 Technical Reference, Volume 8: User Interface</i>
SC23-2390	<i>AIX Version 3.2 Technical Reference, Volume 9: Graphics Library</i>
SC23-2391	<i>AIX Version 3.2 Technical Reference, Volume 10: Keyboard</i>
SC23-2392	<i>AIX Version 3.2 Technical Reference, Volume 11: Master Index</i>

SC23-2205	<i>AIX Version 3.2 General Programming Concepts</i>
SC23-2207	<i>AIX Version 3.2 Kernel Extensions and Device Support Programming Concepts</i>
GG24-3629	<i>AIX Version 3.2 Writing a Device Driver</i>
SC23-2453	<i>AIX Version 3.2 Text Formatting Reference</i>
GC23-2330	<i>AIX Version 3.2 XPG3 Conformance Statement</i>
GC23-2159	<i>IBM AIX for RISC System/6000 POSIX.1 Conformance Document</i>
SC23-2431	<i>Internationalization of AIX Software: A Programmer's Guide</i>

See the following sections for more general documentation:

- Industry Documentation Available through IBM on page 4-23
- Other Industry Documentation on page 4-25

Communications and Networking Documentation

The following list identifies documentation that describes features of these communications applications:

- AIX (which includes mail, MH, BNU, UUCP, NFS, NIS, TCP/IP, and more)
- AIX 3278/79 Emulation/6000
- AIX Xstation Manager/6000
- AIX 3270 Host Connection Program/6000
- NetWare for AIX/6000
- DirectTalk/6000
- AIX Network Management/6000
- AIX AS/400 Connection Program
- The Distributed Computing Environment for AIX/6000 family of products
- The Encina for AIX/6000 family of products
- AIX SNA Services/6000
- AIX High Availability Multi-Processing/6000

Order Number	Title
GC23-2523	<i>AIX Version 3.2 System User's Guide: Communications and Networks</i>
GC23-2487	<i>AIX Version 3.2 System Management Guide: Communications and Networks</i>
SC23-2433	<i>AIX Version 3.2 Diskless Workstation Management Guide</i>
SC23-2264	<i>Xstation Manager/6000 Version 1.4.1 System Management Guide</i>
SC23-2563	<i>Host Connection Program/6000 Guide and Reference</i>
SC23-2206	<i>AIX Version 3.2 Communications Programming Concepts</i>
SC23-2419	<i>NetWare for AIX/6000 from IBM v3.11 Installation Guide</i>
SC23-2423	<i>NetWare for AIX/6000 from IBM v3.11 User Basics</i>
SC23-2422	<i>NetWare for AIX/6000 from IBM v3.11 Concepts Guide</i>
SC23-2420	<i>NetWare for AIX/6000 from IBM v3.11 System Administration Guide</i>
SC23-2424	<i>NetWare for AIX/6000 from IBM v3.11 System Messages</i>
SC23-2421	<i>NetWare for AIX/6000 from IBM v3.11 Utilities Reference</i>
SC23-2428	<i>NetWare for AIX/6000 from IBM v3.11 Printer Server Reference</i>

GC22-0100	<i>DirectTalk General Information and Planning</i>
SC22-0101	<i>DirectTalk Installation Guide</i>
SC22-0110	<i>DirectTalk Getting Started</i>
SC22-0103	<i>DirectTalk Configuration and Administration Guide</i>
SC22-0102	<i>DirectTalk Voice Application Developer's Guide</i>
SC22-0105	<i>DirectTalk Problem Solving Guide</i>
SC22-0106	<i>DirectTalk Quick Reference</i>
SC22-0111	<i>DirectTalk Master Index</i>
SC22-0109	<i>DirectTalk User's Guide, Release 2</i>
SC22-0104	<i>DirectTalk Custom Server Programmer's Guide</i>
SB35-4069	<i>AS/400 Connection Program User's Guide</i>
GC23-2434	<i>AIX Distributed Computing Environment/6000 Release Notes</i>
SC23-2477	<i>AIX Distributed Computing Environment/6000 Overview</i>
SC23-2475	<i>AIX Distributed Computing Environment/6000 Administration Guide</i>
SC23-2602	<i>AIX Distributed Computing Environment Global Directory Services/6000 Administration Guide and Reference</i>
GC23-2581	<i>Encina for AIX/6000 Release Notes</i>
SC23-2443	<i>Encina for AIX/6000 Product Family Overview</i>
SC23-2458	<i>Encina for AIX/6000 Application Development Guide</i>
SC23-2464	<i>Encina for AIX/6000 Base Reference</i>
SC23-2465	<i>Encina for AIX/6000 Transactional-C Programmer's Guide and Reference</i>
SC23-2459	<i>Encina for AIX/6000 Server Reference</i>
SC23-2461	<i>Encina Server for AIX/6000 Administration: System Administrator's Guide and Reference</i>
SC23-2460	<i>Encina for AIX/6000 Server Administration: Programmer's Guide and Reference</i>
SC23-2468	<i>Encina for AIX/6000 SFS Administrator's Guide and Reference</i>
SC23-2466	<i>Encina for AIX/6000 SFS Programmer's Guide and Reference</i>
SC23-2469	<i>Encina for AIX/6000 ISAM Implementation and Extensions Guide</i>
SC23-2472	<i>Encina for AIX/6000 Monitor Administrator's Guide and Reference</i>
SC23-2470	<i>Encina for AIX/6000 Monitor Programmer's Guide and Reference</i>
SC23-2462	<i>Encina for AIX/6000 PPC System Administrator's Guide and Reference</i>
SC23-2463	<i>Encina for AIX/6000 PPC Executive Programmer's Reference</i>
SC31-7002	<i>Using AIX SNA Services/6000</i>
SC31-7003	<i>AIX SNA Services/6000: Writing Transaction Programs</i>
SC31-7014	<i>AIX SNA Services/6000 Reference</i>

SC23-2409	<i>High Availability Cluster Multi-Processing/6000 Planning and Installation Guide</i>
SC23-2510	<i>High Availability Cluster Multi-Processing/6000 Administration Guide</i>
SC23-2408	<i>High Availability Cluster Multi-Processing/6000 System Overview</i>
SC23-2415	<i>High Availability Cluster Multi-Processing/6000 Application Programming Interface Guide</i>
SC23-2509	<i>AIX High Availability Cluster Multi-Processing/6000 Version 2.1 Troubleshooting Guide</i>

See the following sections for more communications documentation:

- General Software Documentation on page 4-16
- Industry Documentation Available through IBM on page 4-23
- Other Industry Documentation on page 4-25

User Interface Documentation

The following list identifies documentation that describes features of these user interface applications:

- AIXwindows Environment/6000
- AIXwindows Interface Composer/6000
- Ultimedia Services/6000

Order Number	Title
GC23-2432	<i>AIXwindows Environment/6000 Version 1.2 Desktop User's Guide</i>
SC23-2404	<i>AIX Version 3.2 User Interface Programming Concepts: AIXwindows and Enhanced X-Windows, Volume 1 (part of SBOF-1540)</i>
SC23-2405	<i>AIX Version 3.2 User Interface Programming Concepts: AIXwindows Interface Composer, Volume 2 (part of SBOF-1540)</i>
SC23-2278	<i>AIX Computer Graphics Interface Toolkit/6000 Programming Concepts and Reference</i>
SC23-2557	<i>AIXwindows Interface Composer/6000 Version 1.2 Getting Started with AIXwindows Interface Composer</i>
SC23-2570	<i>AIXwindows Interface Composer/6000 Version 1.2 Installing and Configuring AIXwindows Interface Composer</i>
SC23-2558	<i>AIXwindows Interface Composer/6000 Version 1.2 Developer's Guide</i>

SC23-2559 *AIXwindows Interface Composer/6000 Version 1.2 Extending and Customizing AIXwindows Interface Composer*

SC23-2528 *AIX Ultimeia Services/6000 Guide and Reference*

See the following sections for more user interface documentation:

- General Software Documentation on page 4-16
- Industry Documentation Available through IBM on page 4-23

Graphics Documentation

The following list identifies documentation that describes features of these graphics applications:

- AIXwindows Environment/6000
- AIX Computer Graphics Interface Toolkit/6000
- Graphics File Translator/6000
- Graphics Plotting System/6000

Order Number	Title
SC23-2208	<i>AIX Version 3.2 Graphics Library (GL) Programming Concepts</i>
SC33-8190	<i>The graPHIGS Programming Interface: Introducing</i>
SC33-8198	<i>The graPHIGS Programming Interface: Getting Started</i>
SC33-8191	<i>The graPHIGS Programming Interface: Understanding Concepts</i>
SC33-8192	<i>The graPHIGS Programming Interface: Writing Applications</i>
SC33-8130	<i>The graPHIGS Programming Interface: Customization and Problem Diagnosis</i>
SC33-8196	<i>The graPHIGS Programming Interface: Messages and Codes</i>
SC33-8195	<i>The graPHIGS Programming Interface: Quick Reference</i>
SC33-8193	<i>The graPHIGS Programming Interface: Technical Reference</i>
SC33-8194	<i>The graPHIGS Programming Interface: Subroutine Reference</i>
SC28-2705	<i>The graPHIGS Programming Interface: ISO PHIGS Quick Reference</i>
SC28-8140	<i>The graPHIGS Programming Interface: ISO PHIGS Subroutine Reference</i>
SC33-8111	<i>The Personal graPHIGS Programming Interface: User's Guide for the GKS/CO</i>
SC33-8112	<i>The Personal graPHIGS Programming Interface: Subroutine Reference for the GKS/CO</i>
SC33-8113	<i>The Personal graPHIGS Programming Interface: Quick Reference for the GKS/CO</i>
SC23-2334	<i>Graphics File Translator Programming Concepts and Reference</i>

SC23-2335	<i>Graphics Plotting System Programming Concepts and Reference</i>
SC23-2440	<i>AIX Version 3.2 M-Video Capture Adapter: Device Driver and Sample Programs</i>

See the following sections for more graphics documentation:

- General Software Documentation on page 4-16
- Industry Documentation Available through IBM on page 4-23
- Other Industry Documentation on page 4-25

Compiler and Run Time Environment Documentation

The following list identifies documentation that describes features of these applications:

- AIX (XL C and Assembler)
- C Set ++ for AIX/6000 Version 2.1
- AIX XL C++ Compiler Version 1.1
- AIX XL Pascal Compiler/6000 Version 2.1
- AIX XL Pascal Compiler/6000 Version 1.1
- AIX XL Pascal Run Time Environment/6000 Version 1.1
- XL Fortran Compiler/6000 Version 3
- AIX XL FORTRAN Compiler/6000 Version 2
- AIX XL FORTRAN Run Time Environment/6000 Version 2
- AIX Ada Compiler/6000
- AIX Ada Run Time Environment/6000

Order Number	Title
SC09-1259	<i>AIX Version 3.2 for RISC System/6000 XL C User's Guide</i>
SC09-1260	<i>AIX Version 3.2 for RISC System/6000 XL C Language Reference</i>
SX09-1280	<i>AIX Version 3.2 for RISC System/6000 XL C Reference Summary</i>
SC09-1705	<i>Optimization and Tuning Guide for XL Fortran, XL C and XL C++</i>
SC09-1545	<i>Optimization and Tuning Guide for XL FORTRAN and XL C Compilers</i>
SC23-2197	<i>AIX Version 3.2 Assembler Language Reference</i>
GC09-1608	<i>Installation Instructions for IBM C Set ++ for AIX/6000 Version 2.1</i>
SC09-1602	<i>Collection Class Library Reference for IBM C Set ++ for AIX/6000 Version 2.1</i>
SC09-1603	<i>Source Code Browser User's Guide for IBM C Set ++ for AIX/6000 Version 2.1</i>
SC09-1604	<i>Class Library Reference for IBM C Set ++ for AIX/6000 Version 2.1</i>
SC09-1605	<i>User's Guide for IBM C Set ++ for AIX/6000 Version 2.1</i>
SC09-1606	<i>C++ Language Reference for IBM C Set ++ for AIX/6000 Version 2.1</i>
SC09-1728	<i>HeapView Debugger User's Guide for IBM C Set ++ for AIX/6000 Version 2.1</i>
SC09-1729	<i>Application Support Class Library Reference for IBM C Set ++ for AIX/6000 Version 2.1</i>
SC09-1730	<i>C Language Reference for IBM C Set ++ for AIX/6000 Version 2.1</i>
SX09-1281	<i>Reference Summary for IBM C Set ++ for AIX/6000 Version 2.1</i>
GC09-1475	<i>Installation Instructions for XL C++ Compiler</i>

SC09-1472	<i>User's Guide for XL C++ Compiler</i>
SC09-1471	<i>Class Library Guide for XL C++ Compiler</i>
SC09-1538	<i>Source Code Browser User's Guide for XL C++ Compiler</i>
SC09-1470	<i>Language Reference for XL C++ Compiler</i>
GC09-1775	<i>Installation Instructions for AIX XL Pascal Compiler/6000 Version 2.1</i>
SC09-1756	<i>User's Guide for AIX XL Pascal Compiler/6000 Version 2.1</i>
SC09-1757	<i>Language Reference for AIX XL Pascal Compiler/6000 Version 2.1</i>
SK2T-0210	<i>Install Kit for XL Pascal Compiler</i>
SK2T-0206	<i>Install Kit for XL Pascal Run Time Environment</i>
SC09-1326	<i>XL Pascal User's Guide</i>
SC09-1327	<i>XL Pascal Language Reference</i>
SC09-1610	<i>XL Fortran Compiler/6000 Version 3 User's Guide</i>
SC09-1611	<i>XL Fortran Compiler/6000 Version 3 Language Reference</i>
GC09-1352	<i>Installation Instructions for XL FORTRAN Compiler</i>
GC09-1351	<i>Installation Instructions for XL FORTRAN Run Time Environment</i>
SC09-1354	<i>XL FORTRAN User's Guide</i>
SC09-1353	<i>XL FORTRAN Language Reference</i>
SC09-1321	<i>Ada User's Guide</i>
SC09-1141	<i>Ada Language Reference</i>
SC09-1395	<i>Support Package Reference for Ada</i>

See the following sections for more programming documentation:

- General Software Documentation on page 4-16
- Industry Documentation Available through IBM on page 4-23

Documentation for Additional Licensed Programs

The following list identifies documentation that describes features of these applications:

- InfoCrafter/6000
- AIX Performance Toolbox/6000
- AIX Performance Aide/6000
- AIX Access for DOS Users
- PC Simulator/6000
- UniTree for AIX/6000

Order Number	Title
SC23-2396	<i>AIX InfoCrafter/6000 Version 1.1 User's Guide and Reference</i>
SC23-2579	<i>AIX Performance Toolbox/6000 User's Guide</i>
SC23-2556	<i>AIX System Performance Measurement Interface/6000 Programmer's Guide and Reference</i>
SC23-2452	<i>Personal Computer Simulator/6000 Guide and Reference</i>
SC23-2503	<i>AIX Access for DOS Users: Release Notes</i>
SC23-2507	<i>AIX Access for DOS Users: Installation Guide</i>

SC23-2502	<i>AIX Access for DOS Users: User's Guide</i>
SC23-2504	<i>AIX Access for DOS Users: Reference</i>
SC23-2508	<i>DOS Server for AIX: Installation and Server Notes</i>
SC23-2506	<i>DOS Server for AIX: Administrator's Guide</i>
SC23-2496	<i>UniTree for AIX/6000 Installation and Planning Guide</i>
SC23-2497	<i>UniTree for AIX/6000 User's Manual</i>
SC23-2498	<i>UniTree for AIX/6000 System Administration Guide</i>
SC23-2499	<i>UniTree for AIX/6000 Problem Determination Guide</i>

Also see General Software Documentation on page 4-16.

Industry Documentation Available through IBM

The following list identifies some of the documentation that is not produced by IBM but that is available through IBM. This documentation describes functions available in the RISC System/6000 and AIX products.

Order Number	Bibliography
GA23-2674	Hoskins, Jim. <i>IBM RISC System/6000: A Business Perspective</i> . New York: John Wiley & Sons, 1993.
SR28-4962	The <i>UNIX / X Window Nutshell Combo Pack</i> contains: Todino, Grace, and John Strang, Jerry Peek. <i>Learning the UNIX Operating System</i> . Sebastopol, CA: O'Reilly & Associates, 1993. Gilly, Daniel, and the staff of O'Reilly & Associates. <i>UNIX in a Nutshell: A Desktop Quick Reference for System V and Solaris 2.0</i> . Sebastopol, CA: O'Reilly & Associates, 1992. Cutler, Ellie, Daniel Gilly, and Tim O'Reilly, ed. <i>The Definitive Guides to the X Window System: Desktop Quick Reference, The X Window System in a Nutshell for Version 11 Release 4 and Release 5 of the X Window System</i> . Sebastopol, CA: O'Reilly & Associates, 1992.
SR28-4966	Lamb, Linda. <i>Learning the vi Editor</i> . Sebastopol, CA: O'Reilly & Associates, 1990.
SR28-4965	Peek, Jerry, Mike Loukides, and Tim O'Reilly. <i>UNIX Power Tools</i> . Sebastopol, CA: O'Reilly & Associates, 1993.
SR28-4856	Frisch, Aileen. <i>Essential System Administration</i> . Sebastopol, CA: O'Reilly & Associates, 1991.
SR28-4870	Garfinkel, Simson, and Gene Spafford. <i>Practical UNIX Security</i> . Sebastopol, CA: O'Reilly & Associates, 1991.
SR28-4963	Nye, Adrian, ed. <i>The Definitive Guides to the X Window System Volume Two: Xlib Reference Manual, Third Edition for X11, Release 4 and Release 5</i> . Sebastopol, CA: O'Reilly & Associates, 1992.
SR28-4854	Quercia, Valerie, and Tim O'Reilly. <i>The Definitive Guides to the X Window System: Volume 3, X Window System User's Guide, Motif Edition</i> . Sebastopol, CA: O'Reilly & Associates, 1993.
SR28-5116	Gaskins, Tom. <i>PEXlib Programming Manual</i> . Sebastopol, CA: O'Reilly & Associates, 1992.

- SR28-5125 OpenGL Architecture Review Board. *OpenGL Reference Manual: The Official Reference Document for OpenGL, Release 1*. Reading, MA: Addison-Wesley Publishing Company, 1992.
- SR28-5126 OpenGL Architecture Review Board, Jackie Neider, Tom Davis, and Mason Woo. *OpenGL Programming Guide: The Official Guide to Learning OpenGL, Release 1*. Reading, MA: Addison-Wesley Publishing Company, 1993.
- SR28-4972 Oualline, Steve. *Practical C Programming*. Sebastopol, CA: O'Reilly & Associates, 1993.
- SR28-4973 Curry, David A. *Using C on the UNIX System: A Guide to System Programming*. Sebastopol, CA: O'Reilly & Associates, 1991.
- SR28-4968 Dougherty, Dale. *sed & awk*. Sebastopol, CA: O'Reilly & Associates, 1990.
- SR28-4969 Stern, Hal. *Managing NFS and NIS*. Sebastopol, CA: O'Reilly & Associates, 1991.
- SR28-4967 Peek, Jerry. *MH and xmh: E-mail for Users and Programmers*. Sebastopol, CA: O'Reilly & Associates, 1992.
- SR28-4971 Todino, Grace, and Dale Dougherty. *Using UUCP and Usenet*. Sebastopol, CA: O'Reilly & Associates, 1986.
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- SR28-4970 Albitz, Paul, and Cricket Liu. *DNS and BIND*. Sebastopol, CA: O'Reilly & Associates, 1992.
- SR28-4852 Krol, Ed. *The Whole Internet User's Guide and Catalog*. Sebastopol, CA: O'Reilly & Associates, 1992.
- SR28-4853 Hunt, Craig. *TCP/IP Network Administration*. Sebastopol, CA: O'Reilly & Associates, 1992.
- SR28-4991 Open Software Foundation. *Introduction to OSF DCE*. Englewood Cliffs, NJ: Prentice-Hall, 1992.
- SR28-4992 Open Software Foundation. *OSF DCE User's Guide and Reference*. Englewood Cliffs, NJ: Prentice-Hall, 1993.
- SR28-4993 Open Software Foundation. *OSF DCE Administration Reference*. Englewood Cliffs, NJ: Prentice-Hall, 1993.
- SR28-4994 Open Software Foundation. *OSF DCE Application Development Guide*. Englewood Cliffs, NJ: Prentice-Hall, 1993.
- SR28-4995 Open Software Foundation. *OSF DCE Application Development Reference*. Englewood Cliffs, NJ: Prentice-Hall, 1993.
- SR28-4855 Rosenberry, Ward, David Kenney, and Gerry Fisher. *Understanding DCE*. Sebastopol, CA: O'Reilly & Associates, 1992.
- SR28-4961 Shirley, John. *Guide to Writing DCE Applications*. Sebastopol, CA: O'Reilly & Associates, 1992.

Other Industry Documentation

The following list identifies some documentation that describes functions available in the RISC System/6000 and AIX products but is not produced by IBM. Documentation on this list was not available through IBM at the time this book was printed.

Quarterman, John S. *The Matrix: Computer Networks and Conferencing Systems Worldwide*. Digital Press, 1990.

Hunter, Bruce H., and Karen Bradford Hunter. *UNIX Systems Advanced Administration and Management Handbook*. New York: Macmillan, 1991.

Gaskins, Tom. *PHIGS Programming Manual*. Sebastopol, CA: O'Reilly & Associates, 1992.

Rosenblatt, Bill. *Learning the Korn Shell*. Sebastopol, CA: O'Reilly & Associates, 1993.

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