The IBM RT Personal Computer

Facts Folder

Preface

This publication describes the IBM RT PC. Topics discussed include IBM 6150 and 6151 System Unit highlights, attachment of I/O devices, communications capabilities, the Advanced Interactive Executive (AIX) Operating System[1], and features of key licensed programs.

This publication will be updated periodically to reflect changes; however, the authoritative sources of information for the associated components and for programming support are the IBM System Library Publications.

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[1] The UNIX component of the AIX Operating System was developed by IBM and INTERACTIVE Systems Corporation. The AIX Operating System is based on INTERACTIVE's INix which is based in turn on UNIX System V, as licensed by AT & T Bell Laboratories.

Contents

Introduction

The IBM RT Personal Computer is a microprocessor-based workstation system for the technical professional. The RT PC offers a multi-user, multitasking operating system with an ease-of-use interface to system services. Programming languages for engineering and scientific application development are supported.

The IBM RT PC microprocessor was developed by IBM and uses an integrated chip set based on a 32-bit reduced instruction set computer (RISC) architecture. The chip set consists of a processor and a storage management unit for virtual machine operations with 40-bit addressing.

The IBM RT PC is designed to satisfy computing needs of CAD/CAM, engineering and scientific, academic, and other professional environments. Applications for specific disciplines and personal productivity are supported.

Compatibility with the IBM Personal Computer AT is provided through an optional IBM Personal Computer AT Coprocessor and appropriate software.

The RT PC consists of a 6150 or 6151 System Unit composed of a processing unit, keyboard, memory, fixed disk drive, high capacity diskette drive, integrated date/time clock, and keylock. The 6150 also has two asynchronous (RS232C) serial ports in the base unit.

The RT PC requires a supported display adapter and monitor for display output.

The RT PC licensed programs include the Advanced Interactive Executive (AIX) Operating System, a multi-user, multitasking, virtual storage system derived from Release 1 of the AT & T Bell Laboratories Unix System V.

The Virtual Resource Manager (VRM) portion of the AIX Operating System provides a high-level virtual machine interface. It provides hardware-independent device interfaces that allow the hardware device configuration to be modified without affecting the operating system or application software.

Logical disk support (minidisks) improves system management capability and allows both Disk Operating System (DOS) and AIX formatted files to exist on the same fixed disk.

Support for the main system displays includes multiple virtual terminal support. This allows a user to run multiple tasks, at the same time, from a system-attached keyboard/display, and to switch between the tasks. All tasks continue executing while one task has control of the keyboard and display.

The AIX shell, designed as a familiar interface for experienced UNIX users, is a command interpreter that serves as an interface between the user and the operating system. The DOS shell, within AIX, provides a DOS interface to the AIX Operating System as well as access to both DOS and AIX files. The DOS shell will be familiar to users of DOS on the IBM PC.

The AIX Operating System contains a software emulation of the floating-point functions (IEEE P754 10.1 subset). The optional IBM RT PC Floating-Point Accelerator can be installed for improved performance of programs that use floating point routines.

The AIX Operating System includes several features designed to support program development on the IBM RT PC. For example, new device drivers may be written in the C language and integrated into the VRM to support new hardware. Programming interfaces have been provided to install and configure application programs and new devices in a uniform manner. An assembler and a C compiler are shipped with the AIX

Operating System. Using asynchronous
terminal emulation, the IBM RT PC can
emulate an ASCII display terminal connected
to a host computer.

IBM RT PC System Units

IBM 6150 System Unit

- Model 20 Floor Standing System Unit

    - 1.0 MB storage, expandable to 3.0 MB
    - 40 MB fixed disk drive
    - 1.2 MB diskette drive
    - Two standard asynchronous (RS232C) ports
    - Eight feature slots

- Model 25/A25 Floor Standing System Unit

    - 2.0 MB storage, expandable to 4.0 MB
    - 70 MB fixed disk drive
    - 1.2 MB diskette drive
    - Two standard asynchronous (RS232C) ports
    - Eight feature slots
    - 5080 Attachment Adapter standard in Model A25

- 6150 Product Options

    - Storage expansion of 1.0 MB or 2.0 MB
    - Two additional fixed disk drives of 40 MB or 70 MB each
    - Additional diskette drive of 1.2 MB or 360 KB
    - Floating point accelerator
    - Supported display adapters
    - Supported printer adapters
    - Multiport RS232C or RS422A Display/Printer Adapter
    - 5080 Attachment Adapter (Models 20 and 25 only)
    - 5080 Peripheral Adapter
    - 5080 Dials, Lighted Program Function Keyboard and Tablets
    - IBM RT PC Mouse
    - PC Network Adapter
    - PC 3278/3279 Emulation Adapter
    - 6157 Streaming Tape Drive Adapter

- PC AT Coprocessor
  - PC AT Math Coprocessor
  - PC AT Storage Expansion (512K)

IBM 6151 System Unit

- Model 10 Desk Top System Unit

  - 1.0 to 3.0 MB storage
  - 40 MB fixed disk drive
  - 1.2 MB diskette drive
  - Six feature slots

- 6151 Product Options

  - Storage expansion of 1.0 MB or 2.0 MB
  - Floating point accelerator
  - Supported display adapters
  - Supported printer adapters
  - Multiport RS232C or RS422A Display/Printer Adapter
  - 5080 Peripheral Adapter
  - 5080 Dials, Lighted Program Function Keyboard and Tablets
  - IBM RT PC Mouse
  - PC Network Adapter
  - PC 3278/79 Emulation Adapter
  - 6157 Streaming Tape Drive Adapter
  - PC AT Coprocessor
    - PC AT Math Coprocessor
    - PC AT Storage Expansion (512 KB)

Diskette Drives

- 1.2 MB diskette drive

  - Standard in all system units
  - 96 tracks per inch
  - 98 ms average access time
  - 300-500 K bits/second transfer rate
  - Read/write 1.2 MB diskettes
  - Read-only 360 KB diskettes

- **360 KB Diskette Drive**

  - 48 tracks per inch
  - 250 K bits/second transfer rate
  - 105 ms average access time
  - Read/write 360 KB diskettes

Storage

- **40 MB Fixed Disk**

  - Standard on 6151 Model 10, 6150 Model 20
  - Option for 6150 upgrades
  - 40 ms average access time
  - 5 M bits/second transfer rate

- **70 MB Fixed Disk**

  - Standard on 6150 Model 25
  - Option for 6150 upgrades
  - 40 ms average access time
  - 5 M bits/second transfer rate

5080 Attachment Adapter

- Connects 5080 Graphics System to IBM RT PC 6150 System Unit
- 5080 may also be host connected
- Transfer rate between IBM RT PC and 5080 up to 2 M bits/sec

IBM RT PC Input/Output Devices

Displays

The IBM 6153 Advanced Monochrome Graphics Display is a 12-inch (30.48 cm), medium resolution (720 x 512 PEL) all-points-addressable black-on-white display, designed for use with IBM RT PC applications that require both alphameric and graphic output.

The IBM 6154 Advanced Color Graphics Display is a medium-resolution (720 x 512 PEL) all-points-addressable, red-green-blue (APA RGB) video monitor that provides for the color display of alphameric and graphic results from RT PC programs. This 14-inch (35.56 cm) display has a screen area of 25 rows of 80 characters and supports up to 16 simultaneous colors.

The IBM 6155 Extended Monochrome Graphics Display is a high-resolution (1024 x 768 PEL) APA black-on-white display that permits the viewing of graphic and text applications on a 15-inch (38.10 cm) display.

In addition, the RT PC can use the IBM 5151 PC Monochrome Display and the IBM 5154 PC Enhanced Color Display.

6157 Streaming Tape Drive

- Up to 55 MB storage capacity
- Uses standard 1/4-inch tape cartridge
- 4 MB/minute burst data rate
- Back-up by image or file by file

Printers

- 3812 Pageprinter
- 4201 Proprinter
- 5201 Quietwriter
- 5152 Graphics Printer
- 5182 Color Printer

Plotters

- 6180 (8 pens)
- 7371 (2 pens)
- 7372 (6 pens)
- 7374 (8 pens)
- 7375 (8 pens)

Programming Features

A full range of system software is available to provide operating system functions, support for I/O device drivers, virtual resource management, program development facilities, and system application support. In addition, software is available to provide for coexistence with the PC environment.

The AIX Operating System

The AIX Operating System is a multi-user, multitasking, virtual storage operating system. It can operate as a single- or multi-user system with up to eight concurrent users.

AIX provides a broad range of functions:

- Multiple user interfaces:
  - Usability Services shell (menu-driven)
  - DOS shell
  - UNIX shell (Bourne)
  - C-shell
- Virtual resource manager
- Menu-driven installation and configuration
- Change level management
- Problem determination, tracing, error logging
- IEEE floating point emulation
- Full-screen editor
- Upward compatible support for a UNIX System V environment
- C compiler, utilities

AIX provides several installation time options:

- INed[1] editor – a full-screen, general purpose editor
- Asynchronous terminal emulation

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[1] INed is a registered trademark of INTERACTIVE Systems Corporation.

- Multi-user services – accounting support, other terminal-oriented UNIX functions
- Extended services – program development support
- Base PC network services – support for the IBM RT PC Network Local Area Network

Licensed Programs

IBM RT PC Data Management Services

- Multi-user data management system
- Extends AIX support of files and directories
- Provides record management facilities
- Provides field management facilities

IBM RT PC SQL/RT Data Base

- A relational data base management system
- Both programmer and end-user facilities
- Provides facilities to enter, retrieve, modify, display, or print
- Requires IBM RT PC Data Management Services
- A programming interface for C language

IBM RT PC Personal Computer AT Coprocessor Services

- Allows many PC AT programs to run on the IBM RT PC
- Executes concurrently with programs running under AIX
- Shares display and fixed disk with AIX
- Shared main storage or dedicated option
- Optional support of IBM PC AT Math Coprocessor

IBM RT PC BASIC Interpreter and Compiler

- Function comparable to the IBM PC BASIC 1.1
- Interpreter (IBM PC BASIC) plus extensions

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- Supports both IBM PC mode and IBM RT PC native mode
- Provides support for subroutines written in C language

IBM RT PC Pascal

- Function comparable to IBM PC Pascal compiler, Version 1.0
- (IBM PC Pascal) plus extensions
- Supports both IBM PC mode and IBM RT PC native mode
- Provides support for subroutines written in C and FORTRAN

IBM RT PC FORTRAN 77[1]

- Implementation of FORTRAN 77, with additional enhancements
- Provides Extended FORTRAN Language (EFL) and Rational FORTRAN (RATFOR)

IBM RT PC Professional Graphics Series

- IBM RT PC Graphics Development Toolkit

  - Provides tools for programmers who develop graphic applications
  - Provides a set of graphics device drivers for printers, plotters, and displays
  - Includes a set of graphics primitives to be called by high-level languages

- IBM RT PC Graphics Terminal Emulator

  - Allows the IBM RT PC to emulate the Tektronix[2] 4010 and 4100 protocols

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[1] FORTRAN 77 was developed for IBM by INTERACTIVE Systems Corporation of Santa Monica, California. It is based on the FORTRAN 77 compiler licensed by AT & T Bell Laboratories.

[2] Trademark of Tektronix, Inc.

- Allows the IBM RT PC to emulate the Lear Siegler ADM-3A[1] terminal
- Provides an icon-driven user interface

- **IBM RT PC Plotting System**

    - A subroutine library to assist the user in developing programs to produce various types of charts
    - Supports area, bar, line, pie, scatter, schedule, step and text-only chart types
    - Includes language bindings for FORTRAN, Pascal, C and BASIC compilers

- **IBM RT PC Graphical File System**

    - Supports retrieval, interpretation, and output of computer-generated graphics stored independent of devices
    - Includes an icon-driven, interactive user interface

IBM RT PC 3278/79 Emulation

- **Provides 3270 emulation and file transfer capability**
- **Emulates IBM 3278 Display Station Model 2**
- **Emulates IBM 3279 Color Display Station Model 2A or S2A**
- **Base 3270 data-stream support**
- **Concurrent operation of 3278/79 session and AIX**

IBM RT PC INmail/INnet

- **Provides queued transfer of files and electronic messages**
- **Uses asynchronous communications to send and receive electronic mail**

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[1] ADM is a trademark of Lear Siegler, Inc.

Display and Hardware Support

- **Display Support**

The following table gives an overview of the display support by various programs.

PROGRAM NAME	DISPLAYS SUPPORTED					
	6153	6154	6155	5151	5154	5080
AIX Operating System	yes	yes	yes	yes	yes	
PC AT Coprocessor Services	yes	yes	yes	yes	yes	
Data Management Services	yes	yes	yes	yes	yes	
BASIC	yes	yes	yes	yes	yes	
FORTRAN 77	yes	yes	yes	yes	yes	
Pascal	yes	yes	yes	yes	yes	
SQL/RT Data Base	yes	yes	yes	yes	yes	
INmail/INnet/ FTP	yes	yes	yes	yes	yes	
3278/79 Emulation	yes			yes	yes	

(Continued)

PROGRAM NAME		DISPLAYS SUPPORTED					
		6153	6154	6155	5151	5154	5080
Professional Graphics Series		yes	yes	yes	yes	yes	
Professional CADAM							yes
Personal graPHIGS							yes

• **Software Disk Space Requirements**

The following tables give the approximate program sizes in megabytes of the software available for the RT PC.

The tables give only program sizes. In addition there must be adequate space for user data files and to accommodate software that is written or acquired at some future date. Following the tables is a short discussion of paging space requirements.

AIX Operating System Program Sizes in Megabytes

PROGRAM NAME	SIZE
Virtual Resource Manager	1.05
Base System Program	11.7
DUMP Area	1.2
Update to Operating System	2.0
INed	2.63
Usability Services	2.72
Asynchronous Terminal Emulator	.31
Multi-User Services	
Accounting Support	.35
System Activity Recording	.13
Interworkstation Commands	.1
Terminal Support	.32
Extended Services	
Administrative Support	.33
Extended Programming Support	.72
Source Code Control	.4
Text Support	.9
uucp Support	.33
vi Editor	.21
Games	.33
Base PC Network Services	.09
Exploring Usability Services	.91

Licensed Program Sizes in Megabytes

PROGRAM NAME	SIZE
PC AT Coprocessor	.57
BASIC	2.82
Data Management Services	1.38
FORTRAN 77	.92
INmail/INnet/FTP	1.9
3278/79 Emulation	.45
Pascal	1.4
SQL/RT Data Base	1.8
Profession Graphics Series	
Development Toolkit	1.37
Terminal Emulator	1.37
Plotting System	1.71
File System	1.37

Application Program Sizes in Megabytes

PROGRAM NAME	SIZE
Applix IA	11.72
Workstation Publishing Software	3.52
SAMNA+	2.35
IMSL	
Single-precision Library	3.8
Double-precision Library	3.57
SFUN Library	1.05
PROTRAN Library	
MATH/PROTRAN	3.3
STAT/PROTRAN	3.52
LP/PROTRAN	2.35
SOLOMON III	3.5
General Ledger	1.18
Payroll	2.0
Accounts Payable	1.64
Accounts Receivable	1.52
Purchasing	.6
Order/Entry Invoicing	1.0
Job Costing	1.35
Fixed Assets	.69
Sales Analysis	.5
Inventory	1.3
Address and Mail List	.3
Database Reported	.2
Trial Database	.45
Log File	2.5
UNIRAS	2.75
RASPAK	1.1
BIZPAK	.37
GEOPAK	.4
KRIGPAK	.2
SEISPAK	.15
GEOINT	.25
GIMAGE	.03
UNIGRAPH	1.4
UNIMAP	1.6
UNIEDIT	1.2
RS/1	3.5
PROFESSIONAL CADAM	10.0
Personal graPHIGS	1.5

The IBM RT PC system also requires that space be allocated for paging of data. The recommended paging space size is dependent on the number and size of the disk drives and the amount of Random Access Memory on the system. The following table gives some approximate values in megabytes for a few configurations:

Sample Paging Space Sizes in Megabytes

	1 megabyte of RAM	4 megabytes of RAM
One 40 megabyte drive	3.7	6.6
Three 70 megabyte drives	6.1	10.8