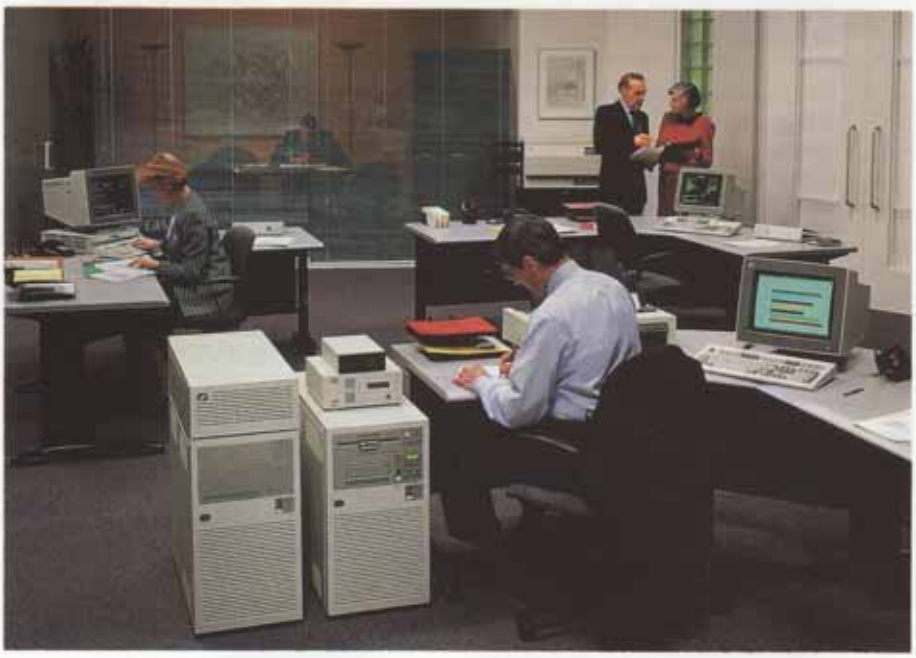
IBM Application System/400, 9404 Models E10, E20 and E25

Extending your competitive edge



The IBM Application System/400® (AS/400®) is a family of advanced, high-function, easy-to-use computers. Designed for growing businesses, the AS/400 family offers a wide range of models...versatile connectivity features...cooperative application server capabilities... plus an impressive array of powerful business applications.

The 9404 Models E10, E20 and E25 are compact units designed for quiet office environments. (9404 models with the Expansion Unit feature are designed to operate in a general business environment.) The 9406 Models E35, E45, E50, E60, E70, E80 and E90 are modular units that utilize rack-mounted packaging for higher performance and growth.

Increased price/performance, improved capabilities

These new processor models demonstrate IBM's continued commitment to the evolution of the AS/400 family. As a result, the 9404 system now offers greater processing power, increased processor memory, increased DASD capacity, standard battery backup and a greater selection of products and capabilities over previous models. The AS/400 9404 system offers:

- *A selection of system sizes* ranging from a few workstations to extensive networks
- *Advanced communications capability* through the Six-Line Communication Controller and Integrated Services Digital Network (ISDN) Adapter
- *Effective, efficient backups* with the standard 525MB, ¼-inch Cartridge Tape Unit, the IBM 7208 2.3GB External 8mm Tape Drive, or the IBM 9348 Magnetic Tape Unit
- *Excellent user productivity* due to response time and system throughput, advanced communications, reduced system backup time, new application development tools, and new ease-of-use printer features
- *Strong growth potential* with processors that can support many users and complex applications, advanced connectivity, and flexible, space-efficient configurations
- *System management functions* with high-capacity save/restore features and optional protection from power outages
- *Solid investment protection* since installed customers can take advantage of field upgrade options
- *Growing business opportunities* due to advanced cooperative processing capabilities, as well as the ability to accommodate the needs of future technology applications such as voice, image and artificial intelligence

Advanced architecture

The system processor uses Very Large Scale Integration (VLSI) logic and has a 32-bit data path and 48-bit addressing that has the capability to address 281 trillion bytes of storage. It is implemented with a software and hardware architecture that can accommodate up to 64-bit addressing.

Advanced operating system capabilities

The AS/400 family is supported by the IBM Operating System/400® (OS/400®) and all its associated licensed programs. This advanced, flexible operating system enables end users, programmers and system operators to access menus, displays and printers that are easy to use and consistent with user interface guidelines defined by IBM Systems Application Architecture® (SAA™). OS/400 runs on all models of the AS/400 system, helping to provide protection for the investments made in application programs.

The design consistency in OS/400 interfaces offers programmers and system operators a significant number of functions previously available in other products, in addition to many new, easy-to-use functions.

OS/400 helps ensure that users get the most from these IBM AS/400 processors. It integrates a powerful relational database with a simple, menu-driven interface and online system tutorial education to provide the following functions:

- Communications
- Data management
- Multilingual support
- Programmer services
- System services
- System/36, System/38 and Application System/Entry™ (AS/Entry) application program support

A variety of system options

To provide an organization with ease of connectivity and increased flexibility, IBM Personal Computers, the IBM Personal System/2® (PS/2®), and many non-IBM products can also be incorporated into an AS/400 network. In addition, the AS/400 system can include a wide variety of Input/Output (I/O) devices.

AS/400 system highlights

- All models have a single, consistent operating system with an integrated relational database
- Runs most System/36, System/38 and AS/Entry application programs with minimal need to recompile and modify source code
- Simple operation with built-in menus for general users and a command-level interface for more experienced users
- Online help
- Supports cross-system and enterprise-wide connectivity with personal computer (PC) integration that provides common menus for PC and AS/400 applications, file server and printer sharing
- Offers optional comprehensive office support, including high-function text processing, proofreading assistance, document management, directories, distribution lists, calendar and electronic mail
- Advanced Function Printing™ Utilities/400 (AFP™ Utilities/400) provides support for IBM's family of continuous forms and cut sheet Advanced Function Printers. Users can create electronic forms, including scanned images such as company logos, using a system-attached workstation. Electronic forms can reduce or eliminate the need for many pre-printed forms. AFP Utilities/400 can operate with the Facsimile Support/400™ program offering so that output from AFP Utilities/400 can be sent directly to any standard fax machine. AFP Utilities/400 supports the IBM 4224, 4234, 3816, 3820, 3825, 3827, 3835, 4028 and 4230 printers.
- CallPath™/400 option integrates functions and information from a variety of PBX systems
- DASD Mirroring option maintains a second image of all or selected files to minimize system downtime due to single disk failure
- Online education, including Tutorial System Support modules (integrated into the operating system) and the IBM Discover/Education and Personalized Learning Series
- Electronic Customer Support that provides:
  - Local and remote Question/Answer (Q&A) database
  - Technical information access and exchange
  - Remote service assistance, including remote problem analysis
  - Problem Analysis and Resolution (PAR) procedures
- IBM SAA SystemView™ System Manager/400 that provides network focal point support for multiple AS/400 sites
- Worldwide national language support
- Comprehensive communications facilities
- Customer Information Control System (CICS), a licensed program that supports migration to, and development of, CICS applications on AS/400
- Remote IPL of medialess PS/2s

IBM 9404 Processors – Models E10, E20 and E25

These advanced models are a natural choice for dynamic, developing businesses. They offer significant processing power, the latest disk storage technology and a selection of thousands of application programs at an affordable price. Their consistent architecture allows for easy growth and system upgrades – enabling the 9404 Model E10 to be field-upgraded to the Model E20 or E25, the E20 to an E25, and an Expansion Unit to be added to all models. In addition, application software that runs on these models can run on the larger IBM 9406 Processors. 9404 Models B, C and D may be upgraded to 9404 E models, equal to or greater than their model designation.

All system units provide:

- Single-level storage capabilities
- A powerful instruction set that yields directly addressable main storage for data, programs and objects
- Automatic program load to resume operation after power interruptions
- Power keylock to supply a key-controlled switch to restrict power turn-on
- Remote Power On/IPL that allows you to turn the system on remotely from a telephone
- Timed Power On/IPL that allows the system to be turned on at a preset time
- A standard Battery Power Unit feature that provides backup power to the system, for a minimum of five minutes, if there is a power failure
- A design consistent with either quiet office or general business environments
- Time-of-day clock

Device attachments

IBM 9404 E10, E20 and E25 Processors support the following devices to supply a system with auxiliary storage, displays, printers, communications and various other tools that help improve system utilization.

Diskette units

- IBM 9331 Diskette Unit
  - Model 001: 8-inch diskette unit
  - Model 002: 5.25-inch diskette unit

Optical Library Support

- The IBM 3995 Compact Optical Library Dataserver Model 042 is a standalone unit supported on the 9404 Models E10, E20 and E25. The 3995 supports up to 19.5 billion bytes of storage on 32 5.25-inch optical disks. Two internal Write Once Read Many (WORM) drives are standard with each library.

Tape units

- Standard 525MB ¼-inch Cartridge Tape Unit
- IBM 9348 Model 2 Tape Drive
  - 1,600/6,250 bits per inch (bpi) support
  - Table top, ½-inch, 2,400-foot, reel-to-reel
  - Media interchange and save/restore
- IBM 7208 2.3GB External 8mm Tape Drive
  - Table top, 2.3GB capacity

Display stations

- IBM InfoWindow® 3476 Display Station
  - 14-inch green or amber-gold monitor with flat, low-glare, smudge-resistant screen
  - 1,920 characters (24 lines of 80 characters)
  - Three keyboards available: 122-key typewriter, 122-key data entry, 102-key IBM enhanced
  - Three-year warranty
  - Menu setup for customization
- IBM InfoWindow 3477 Display Station
  - Supports two display sessions or one display session and one printer session concurrently
  - In dual-address mode, split-screen plus operator information area
  - Extended character buffer support for enhanced OfficeVision™/400 text entry usability
  - 14-inch green, amber-gold or color monitor with flat, low-glare, smudge-resistant screen.
  - 80 or 132-character line length (monochrome or color)
  - Printer support for host-directed printing
  - Two keyboards available: 122-key typewriter, 102-key IBM enhanced
  - Keystroke record and playback (up to 1,500 characters)
  - Three-year warranty
  - Ergonomic features: compact and lightweight, small footprint, low-profile keyboard with coiled, telephone-like cable
- IBM Personal Computers
  - Supports the IBM PS/2 family
  - Supports the IBM Personal Computer Models 5150, 5160, 5162 and 5170
  - Attached to twinaxial or ASCII workstation controller, IBM Token-Ring Network or, for remote workstation operation, to an IBM 5294 or 5394 Remote Control Unit or via PS/2 SDLC adapter
- IBM 3151 Model 805 ASCII Display Station
  - Standalone, 14-inch, monochrome display station displaying up to 1,920 characters
  - Provides asynchronous (ASYNC) communication interface with a 7-bit or 8-bit word length, using RS-232-C (CCITT V.24/28) interface expandable to additional RS-422-A (CCITT V.11) interface
  - Special AS/400 keyboard included
- IBM 3164 ASCII Display Station
  - Standalone, 14-inch, 80-column color display station displaying up to 1,920 characters
  - Provides ASYNC communication interface with a 7-bit or 8-bit word length, using RS-232-C (CCITT V.24/28) interface expandable to additional RS-422-A (CCITT V.11) interface

Printers

- IBM Personal Page Printer Series II – Models 2380 and 2381
  - Medium usage, 9-wire impact printer
  - 2380: narrow carriage; 2381: wide carriage
  - Single sheet, up to six-part continuous forms and envelopes
  - Burst print speeds:
    Fast Draft – 320 characters per second (cps), 10 characters per inch (cpi)
    Draft – 270 cps Near Letter Quality
    (NLQ) – 65 cps
  - Versatile forms handling
  - ASCII, 3477 or 3197 attachment
- IBM Personal Printer Series II – Models 2390 and 2391
  - Medium usage, 24-wire impact printer
  - 2390: narrow carriage; 2391: wide carriage
  - Single sheet, up to four-part continuous forms and envelopes
  - Burst print speeds:
    Fast Draft – 200 cps, 10 cpi
    Draft – 180 cps
    NLQ – 60 cps
  - Letter Quality (LQ): up to 360 X 360 dots per inch (dpi), all-points-addressable (APA) graphics
  - ASCII, 3477 or 3197 attachment
- IBM 3816 Page Printer
  - High quality, nonimpact, table top page printer
  - LQ printing, text, and graphics – Intelligent Printer Data Stream (IPDS) support
  - Speed: up to 24 impressions per minute (ipm)
  - Duplex capability
  - Twinaxial attachment
- IBM Page Printers – IBM 3820, 3825, 3827 and 3835
  - Medium- to high-speed, LQ, floor-standing laser printers

Model	Speed (ipm)	Forms
3820	20	Cut Sheet
3825	58	Cut Sheet
3827	92	Cut Sheet
3835	88	Continuous Form

- IPDS and AFP support
- Print resolution: 240 X 240 dpi
- Remote print server for System/370™- and System/390™-generated Advanced Function Printing Data Stream (AFPDS) output
- Token-Ring and PS/2 attachment

• IBM LaserPrinter 4019
- Compact, nonimpact, full-page desktop page printer
- Two models:
  Model E01 – Prints up to 5 pages per minute (ppm)
  Model 001 – Prints up to 10 ppm
- Support for the IBM Personal Printer Data Stream (PPDS), Hewlett-Packard LaserJet™ Series II emulation, and plotter emulation (IBM 7372 and HP 7475A plotters)
- LQ text, single sheet or envelopes, and graphics
- Extensive font support
- ASCII or 3477 attachment

• IBM LaserPrinter 4028 Model AS1
- Compact, nonimpact, desktop page printer
- LQ text, single sheet and envelopes, and graphics
- Prints up to 10 ipm
- IPDS support
- Extensive font support
- Twinaxial attachment

• IBM LaserPrinter 4029 Series
- A family of nonimpact, full-page desktop page printers
- General purpose, high performance: up to 600 X 600 dpi
- Four models:
  Model 10 – up to 5 pages per minute (ppm)
  Model 20 – up to 6 ppm
  Model 30 – up to 10 ppm
  Model 40 – up to 10 ppm
- Enhanced font support
- Printer Quality Enhancement Technology (PQET) enhances both LQ print and graphics quality – up to 600 x 600 dpi
- ASCII or 3477/3197 attachment

• IBM ExecJet™ Printer 4072
- Wide carriage, LQ, ink-jet printer
- Burst print speeds – 300-600 cps (draft)
- Single sheet and envelope capability
- Parallel or serial attachment to PC, PS/2

• IBM 4224 Printer
- A serial, dot matrix bi-directional impact printer
- Table top design
- Multiple models offer speeds up to 600 cps
- Color model available
- Graphics printing (144 X 144 dpi)
- IPDS support
- Twinaxial or ASCII attachment

• IBM 4226 Model 302 Printer
- Heavy duty, unattended, table top, 9-wire impact printer
- Burst print speeds: up to 533 cpm
- Up to six-part, continuous forms printing
- ASCII attachment

• IBM 4230 Matrix Printer
- Heavy duty, serial, impact matrix printer
- Two models:

Mode	Model 101	Model 102
Fast Draft	375 cps	480 cps
DP	300 cps	400 cps
NLQ	75 cps	100 cps

- Models field-upgradable
- IPDS and Advanced Function Printing support available – Model 102
- "Quiet office" operation
- Twinaxial attachment

• IBM 4234 Dot Band Printer
- Free-standing, line matrix impact printer
- Print speeds up to 800 lines per minute (lpm) depending on model
- Models may be upgraded
- Graphics printing
- IPDS support on twinaxial models
- Twinaxial or ASCII attachment

• IBM 6252 Impactwriter Printer
- Heavy duty – 800 lpm
- Engraved print band technology
- "Quiet office" design
- Supports Optical Character Recognition (OCR) and bar code printing
- Front access operation
- ASCII (model A8) or twinaxial (model T8) attachment

• IBM 6262 Impact Line Printer
- Heavy duty, floor-standing, high quality, engraved band printer
- Three twinaxial models:
  T12 – up to 1,200 lpm
  T14 – up to 1,400 lpm
  T22 – up to 2,200 lpm
- Easy forms setup and handling
- Supports OCR and bar code printing

NOTE:
All twinaxial attachment printers also attach to a 5X94 Remote Control Unit

Connectivity support

• One twinaxial or one ASCII workstation controller is standard on the IBM 9404, supporting either 40 twinaxial workstations or 18 ASCII workstations. The 9404 E10 and E20 support optionally up to a maximum of 160 twinaxial workstations and up to 162 ASCII workstations. The 9404 E25 supports a maximum of 240 twinaxial workstations or a maximum of 162 ASCII workstations.

• Optional, integrated Six-line Communication Controller provides the basic control and common circuits for up to six communication lines. The concurrent operation of asynchronous (ASYNC), binary synchronous (BSC), synchronous data link control (SDLC) and X.25 protocols and the SDLC X.21 short-hold mode function are supported. A maximum of 96 X.25 virtual circuits are supported per controller. X.21, V.35 and EIA 232/V.24 adapters are supported. The maximum aggregate data rate per controller is 384,000 bits per second (bps). (Double full-duplex line speeds when calculating aggregate line speeds. Full-duplex is standard for X.25 lines and may be required for ASYNC lines.) The maximum number of high-speed lines (48,000 bps or greater) is two.

• ISDN Basic Rate Interface Adapter provides ISDN support. It allows for up to three ISDN lines supporting two 64,000 bps B Channels and one 16,000 bps D Channel per ISDN line using the IDLC protocol.

• A wide range of adapters is available:
- V.35 one-line adapter
- EIA 232/V.24 one-line adapter
- X.21 one-line adapter
- EIA 232/V.24 two-line adapter
- X.21 two-line adapter

• Two IBM Token-Ring Local Area Networks (LANs) are available on 9404 Models E10 and E20. Three are available on 9404 E25.

• Ethernet LAN attachment feature provides direct connection to mixed vendor LANs using either IEEE 802.3 or Ethernet Version 2.

- The Transmission Control Protocol/Internet Protocol (TCP/IP) Utility is a licensed program that allows the AS/400 system to communicate with other systems and devices that support TCP/IP. TCP/IP provides connectivity with both IBM and non-IBM systems.
  - Protocols include: Transmission Control, INTERNET, User Datagram (UD), TELNET, TELNET VT100, Simple Mail Transfer (SMTP), File Transfer (FTP), assigned numbers, and host requirements
  - Connections are via Ethernet, IBM Token-Ring Network or X.25
  - Access to Ethernet is also available via IBM 8209 LAN Bridge
- Communication lines per model (physical attachment):
  Model E10 – 14 lines
  Model E20 – 20 lines
  Model E25 – 26 lines
- Protocols and recommended in-use line speeds in bps per line for the Base Multiple Function I/O Processor. (One 2,400 bps or 9,600 bps SDLC line is usually used for Electronic Customer Support [ECS].):
  - ASYNC:
    Two lines up to 9,600 bps
    One line up to 19,200 bps
    (Plus one 2,400 bps or 9,600 bps ECS line)
  - BSC:
    One line up to 19,200 bps
    (Plus one 2,400 bps or 9,600 bps ECS line)
  - SDLC:
    Two lines up to 9,600 bps
    One line up to 19,200 bps
    (Plus one 2,400 bps or 9,600 bps ECS line)
  - X.25 Packet Switched Networks:
    One line up to 9,600 bps
- Protocols and recommended in-use line speeds in bps per line for the selectable six-line adapter:
  - ASYNC: Up to 19,200 bps
  - BSC: Up to 56,000 bps
  - SDLC: Up to 64,000 bps or up to 640 lbps with SDLC V.35 Data Line and DCE
  - X.25 Packet Switched Networks: Up to 64,000 bps

Remote workstation controllers

- IBM 3174 Establishment Controller for attaching up to 32 coaxial workstations and 24 ASCII workstations
- IBM 5394 Remote Control Unit for attaching up to 16 twinaxial workstations
- IBM 5494 Remote Control Unit
  - Manages operations of workstations and workstation communications to the AS/400
  - Two models: Model 001 supports up to 28 twinaxial devices Model 002, when configured for:
  - Token-Ring connection to the AS/400, supports up to 28 twinaxial devices
  - Remote Token-Ring gateway, supports up to 40 twinaxial or Token-Ring devices (up to 28 devices may be twinaxial)

Controllers, protocol converters and adapters

- IBM 5159 Programmable I/O Controller supports five ASYNC communication ports and a data rate up to 19.2KB/sec. It permits attachment of scales, time clocks, badge readers, scanners, robots, etc. The controller may be wall-, rack or desk-mounted.
- IBM 5209 Link Protocol Converter allows up to seven IBM 3270-type displays and printers to be attached to an IBM AS/400 system either locally or remotely (via the IBM 5394 or 5494 Remote Control Unit), and concurrently to an IBM System/370 through an IBM 3172/3274 Control Unit.
- ROLMbridge 5250 Link Protocol Converter attaches ROLM displays, ASCII displays, IBM PS/2s emulating ASCII displays, and ASCII printers as twinaxially attached 5250 devices.
- IBM 5299 Multiconnector and Twinax to Telephone Twisted-Pair Adapter (TTPA) may be used with appropriate telephone wiring. Initial and ongoing site cabling costs may be reduced with this wiring option.
- In addition to the IBM Ethernet direct support, the IBM 8209 LAN Bridge interconnects an IBM Token-Ring Network and an Ethernet Version 2 or an IEEE 802.3 LAN. Systems and workstations with compatible protocol such as TCP/IP, OSI or SNA can communicate across this connection. The IBM 8209 handles necessary conversion to route information between dissimilar LANs. Token-Ring stations view the 8209 as a bridge to another Token-Ring. To Ethernet/IEEE 802.3 stations, the 8209 LAN Bridge is functionally transparent.

9404 Technical information

Physical specifications:

Models E10, E20, and E25
- Width: 350mm (13.8 in.)
- Depth: 750mm (29.5 in.)
- Height: 650mm (25.6 in.)
- Weight: 91kg (200 lbs.)

Models E10, E20 and E25 with Expansion Unit
- Width: 800mm(1 (31.5 in.)
- Depth: 750mm (29.5 in.)
- Height: 650mm (25.6 in.)
- Weight: 182kg (400 lbs.)

Storage Expansion Unit for Model E25
- Height: 170mm (6.7 in.)
- Weight: 20kg (44 lbs.)

Operating environment:
- Temperature: 10°C to 38°C (50°F to 100°F)*
- Relative humidity: 20% to 80%
- Wet bulb: 23°C (73°F)

* The IBM 9348 Model 2 Tape Drive and the IBM 7208 Model 2 Tape Drive have a dry bulb operating temperature range of 16°C to 32°C (60°F to 90°F).

IBM 9404 Processor Models at a glance

Model	E10[1]	E20[1]	E25[1]
Relative performance[3]	2.6	3.5	4.2
Number of local attached workstations:			
– Twinaxial	1-160	1-160	1-240
– ASCII	1-162	1-162	1-162
Main storage memory (MB)	8-40	8-72	16-80
DASD capacity (MB)	988-11,856	988-11,856	988-15,808
Optical library			
– 3995 Compact Optical Library Dataserver	0-2	0-2	0-2
Save/restore & interchange:			
– ¼-inch cartridge magnetic tape	1-2	1-2	1-2
– ½-inch cartridge tape	0-4	0-4	0-4
– 7208 2.3GB External 8mm Tape Drive	0-4	0-4	0-4
Diskette support:			
– 5.25-inch or 8-inch diskette	0-2	0-2	0-2
Communication lines	1-14	1-20	1-26
IBM Token-Ring LAN adapters	0-2	0-2	0-3

[1] *Including 100mm (4 inches) between system unit and expansion unit for adequate air flow.*

[2] *Capabilities shown are for all models with Expansion Unit.*

[3] *The relative system performance ratios are estimated based on AS/400 Environment RAMP-C workload with a 9404 Model B10 with 16MB of main storage and 945MB of DASD, running under OS/400, equaling 1.0. The ratios shown were estimated at maximum configurations running at 70% utilization. Relative system performance ratios may not be realized in all environments.*

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