All About Mainframes

Contrary to the rumor that the large mainframe was going the way of the mammoth, 1986 was a very active year for the big computer. All mainframe vendors introduced new models or added enhancements to already existing systems. IBM led the way with the introduction of two entry-level 3090 models, and other vendors quickly followed suit. Most active was Burroughs, with the announcements of the A 12, A 5, and entry-level models for both the A 10 Series and the V Series. Cray Research made first delivery on four of its X-MP supercomputer models, indicating a demand for this type of vast computing power in the marketplace.

The micro has not replaced the mainframe as some industry wizards had prophesied. Instead, the micro-mainframe link has emerged. With the integration of microcomputers in the mainframe environment, the need arises for even more power at the mainframe level. Micros are appearing on many desktops and with their number of instructions per second on the rise (IBM is planning a 1 MIPS PC), the mainframe will assume more of a role as a database manager. IBM has already delivered over three million of its personal computers, the majority of which probably have hopes of being connected with a mainframe host. Setting up information centers will further the use of the micro-mainframe connectivity and help to get the information stored on the mainframe to the right people and provide them with the tools they need to manipulate it. There are a lot of software packages available to "link" the micro to the mainframe and they are increasing in number very fast. Behind every successful network of departmental micro-computers stands a corporate mainframe.

Because of a fluctuating economy and the demands placed on cash flow, companies are looking for answers to more efficient operation, and at the hub of their solutions is certainly the mainframe. Most other computer types do not have the power or the speed to handle the volume of data and information that must be processed. The small systems are an important complement to, but will not replace, the

Mainframes today have a smaller footprint, they are faster and more powerful, and feature a much improved price-performance.

This report features the various mainframes, vector, and scalar (general-purpose) processors offered to the end user. Their technology, applications, and market orientation are discussed; we have also included a handy chart of how users rated the big computers over the past years. Detailed comparison columns listing the characteristics of 38 computer systems and model groups from 12 manufacturers are also part of this report.

need for mainframes, particularly in companies with large databases requiring fast and efficient on-line updating.

MAINFRAME FEATURES

The mainframe has become smaller. The footprint has been reduced substantially with VLSI (Very Large Scale Integration), ECL (Emitter Coupled Logic) circuitry, and denser chip packaging. Main memory has become larger. In most mainframes the 256K-bit memory chip is standard. Main memory capacity has been greatly increased, ranging up to 256 megabytes for the Honeywell four-processor Model DPS 90/94. The newly announced quad-processor Model AS/XL 100 from National Advanced Systems (NAS), scheduled for delivery in the third quarter of 1987, will have a maximum main memory capacity of 512 megabytes. Various expanded storage concepts have been implemented to enhance the main storage capabilities of the mainframes. The NAS AS/XL Series provides dynamic working storage which serves as a system-wide cache to enhance access time between high speed-cache, main storage, and I/O processors. Burroughs has an extended main storage feature to remove limitations on memory addressing. IBM and Amdahl have a similar expanded storage ▷

The top-of-the-line twelve processor Model 9884 from NCR is configured with eight Application Processors (APs), four Data Storage Processors (DSPs), and eight communications modules. Each of the loosely-coupled processors has a main memory ranging from two to four megabytes for a total of 48 megabytes.

All About Mainframes

	Mainframe Ratings					
	1986	1985	1984	1983	1982	1981
Ease of operation	3.3	3.3	3.4	3.3	3.2	3.3
Reliability of mainframe	3.7	3.4	3.5	3.6	3.5	3.5
Reliability of peripherals	3.4	3.2	3.2	3.2	3.1	3.1
Maintenance service:						
Responsiveness	3.5	3.3	3.4	3.3.	3.2	3.2
Effectiveness	3.4	3.2	3.3	3.2	3.1	3.1
Technical support:						
Trouble-shooting	3.1	2.9	3.0	2.8	2.7	2.7
Education	3.0	2.9	2.8	2.7	2.7	2.7
Documentation	2.9	2.6	2.7	2.6	2.6	2.6
Manufacturer's software:						
Operating system	3.3	3.3	3.3	3.2	3.1	3.1
Compilers & assemblers	3.3	3.1	3.3	3.2	3.2	3.2
Applications programs	2.7	2.5	2.8	2.7	2.7	2.7
Ease of programming	3.0	2.9	3.1	3.0	3.0	3.1
Ease of conversion	2.9	2.9	3.0	3.0	3.0	3.0
Overall satisfaction	3.2	3.1	3.2	3.1	3.1	3.1

Figure 1: user ratings of mainframes for the last six years.

▷ option to allow users to set aside a portion of main memory for expanded storage. Control Data employs the Unified Extended Memory feature which allows main memory to be partitioned into areas reserved for execution and areas reserved for data storage. Most mainframes employ pipelining and interleaving to further enhance the speed of the system. Another innovation for mainframes are fault tolerant or fully redundant systems. Honeywell, for instance, offers redundant versions within its DPS 88 and DPS 90 large-scale mainframe lines. The fully redundant Honeywell machines feature two of each major system component. The new NCR 9800 System achieves fault tolerance through the use of multiple, loosely coupled, function-specific processors. A form of redundancy in the Burroughs A Series is accomplished with the Mirror Disk. This feature duplicates realtime data on disk units, and maintains multiple copies of disk packs.

Traditional supercomputer manufacturers, Cray Research and Control Data, have been joined by Amdahl, Honeywell, IBM, and NAS in offering vector processors to end users in the scientific and engineering fields. The Amdahl vector facilities use an optimized superset of System/370 architecture and have a cycle time of 7.5 to 7.0 nanoseconds. Honeywell's DPS 90 Series features integrated vector procesors using 63 new vector instructions. The IBM vector option can be added to all four 3090 models and is implemented in both hardware and software. The five models of the new NAS AS/XL VX0 Series and the Honeywell DPS 90 Series have vector processors integrated in each CPU, in contrast to the Amdahl and IBM systems in which the vector processors are separate add-on components. The AS/XL VX0 Series is compatible with the IBM System/370 and System/370 XA architectures.

More detailed descriptions of the hardware and software technology of the different mainframe systems are contained in the "Computer System Reports" section in this volume.

MARKET TRENDS

Lower purchase prices and an overall soft economy brought down the domestic profit margins for most companies, but vendors were compensated by a weak dollar overseas, which helped bring up the foreign earnings. Some manufacturers, NCR is one of them, actually exceeded their profit expectations. Business gains and declines in well-defined target markets also influenced earnings. IBM sales emphasis is on the depressed oil and heavy manufacturing industry, while Sperry sells to government installations, and NCR markets point-of-sale terminals to retail organizations, all very active sections of the market.

The modest mainframe sales rate is likely to continue for the next few years. This development in the marketplace has the vendors scrambling for the so-called niche markets including medical, process control, fault tolerance, and transaction processing. Honeywell is promoting its "smart building" concept: computer controlled lighting, heating, cooling, and security. Amdahl, Honeywell, IBM, and NAS, with their vector processors, now compete with Cray Research and Control Data in the supercomputing marketplace. NCR with its new fault tolerant, transaction processing system is aiming at the banking and financial sector, a traditional Burroughs stronghold.

The mainframe will not disappear just because sales have slowed down. Vendors have to sell their machines a little ▷

All About Mainframes

▷ harder and explore the different markets. The immense processing power and fast response time of a mainframe are needed to handle large databases, manage complex communications networks, and heavy on-line transaction processing for such organizations as banks, insurance companies, airlines, and other transportation companies. There is no alternative in the near future to the mainframe computer.

USER SATISFACTION RATINGS

It is important when evaluating mainframes to determine what experiences users have had to date with their systems. As part of Datapro's 1986 annual Computer System User Survey, more than 5,000 mainframe users were asked to rate their systems and 1,302 users responded.

The user satisfaction ratings of mainframes showed a gradual improvement from 1981 to 1986. The users overall satisfaction ratings indicated very little change. The mainframe reliability ratings showed the greatest improvement. NAS Advanced Systems earned a perfect 4.0 rating in this category.

Users were asked to rate their computer systems and the associated software and vendor support by assigning a rating of Excellent, Good, Fair, or Poor. All ratings are expressed in terms of weighted averages, which were calculated by assigning a weight of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor. The total was then divided by the sum of the number of users who rated each factor. The results of these calculations are found in Figure 1.

For details of the 1986 Datapro Computer System User Survey, please refer to the report titled "User Ratings of Mainframes"on Page 70C-000EB-101.

THE COMPARISON CHARTS

In order to help you assess the major mainframes on the market today, their differences, and their relative costs, comparison charts detailing important functional characteristics are provided. All information in the charts was furnished by the vendors whose products are represented.

The absence of a company or a product from the comparison charts indicates the company failed to respond to our repeated requests for information; the product is no longer actively marketed; or the company is no longer in business.

The entries in the comparison charts and their significance are explained in the following paragraphs. NOTE: *A dash (—) for an entry indicates that the information could not be obtained from the vendor.*

MODELS

This entry lists all the models in a manufacturer's series.

SYSTEM CHARACTERISTICS

Number of CPUs. The number of central processing units that can be supported at one time by a system. While multiple CPU systems require more complex operating systems, their capabilities are greater than single CPU systems.

Number of I/O Processors. Because of expanding I/O demands, manufacturers have elected to meet the servicing requirements of the peripherals with an input/output processor dedicated to that purpose.

Virtual Storage Capability. This indicates the presence of a hardware/software feature that enables the accessing and utilization of memory space without regard to its existence in real main memory or auxiliary memory space.

Plug-Compatible with. IBM or other systems with which the mainframe is interchangeable without modification. Compatibility may be hardware and/or software.

MAIN STORAGE

Main storage or memory in a computer is usually the fastest and most accessible storage in the system, and the one from which most instructions are executed.

Type. The different types of memory and the capacity of the memory chip used in the system.

Cycle Time. The time interval which is needed between the initiation of two successive, independent memory operations is stated in nanoseconds.

Access Time. This entry refers to the time in nanoseconds to read out any randomly selected word in memory. Access time equals latency plus transfer time. ▷
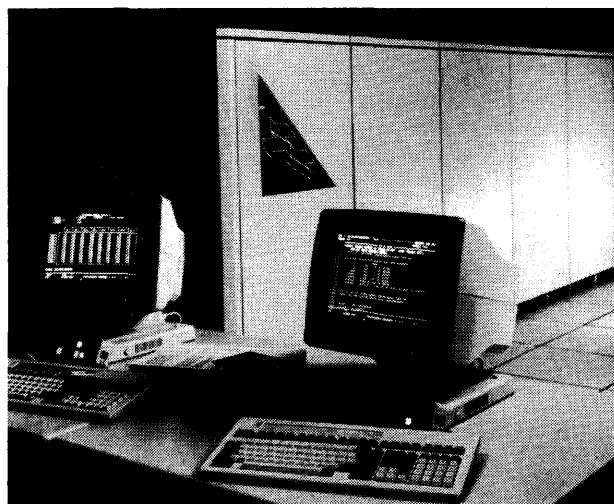
The National Advanced Systems AS/XL Vector Series is available in five models with from one to four processors. Main memory ranges from 32 to 512 megabytes with a memory access time of 120 to 150 nanoseconds.

All About Mainframes

▷ **Bytes Fetched per Cycle.** A byte is a binary character operated upon as a unit. Since a cycle is the smallest time quantum in the process, the more bytes fetched per cycle, generally the more efficient the system.

Minimum Capacity. The basic main memory capacity is listed in megabytes.

Maximum Capacity. The total quantity of data that a system can hold or process.

Increment Size. The size of memory to be expanded in some designated fixed increment without requiring increased processor capability.

Interleaving. This feature improves memory speed by permitting overlapped accesses to two or more independently operating banks of main storage. Two-way interleaving, for example, can effectively double the maximum rate at which data can be transferred between a CPU and its associated main storage.

BUFFER STORAGE

Type. This entry lists the type of buffer memory. If a high-speed cache is used, it is also indicated.

Cycle Time. The time interval required between two successive buffer or cache operations.

Bytes Fetched per Cycle. The number of bytes operated on during a set time interval.

Capacity. The minimum and maximum buffer storage is stated in kilobytes.

CENTRAL PROCESSOR

Machine Cycle Time. The time interval in which the CPU performs a number of operations. It is the time required to change the information in a set of registers. The internal cycle time may be synchronous (fixed or variable) or asynchronous.

Word Length. The number of binary elements or bit string considered as an entity and handled by the CPU. Generally, the longer the word length, the greater the efficiency of the CPU.

Number of Instructions. The number of operations offered by a mainframe's instruction set.

General Registers. The internal addressable registers in the CPU that can be used for different purposes such as temporary storage, an accumulator, an index register, or for any other general-purpose function. Listed in this entry is the number available with the system.

Addressing. When direct addressing is employed, the direct address of an instruction is the number representing the storage location. In the case of indirect addressing, the address part of an instruction specifies a storage location that contains another address rather than the desired operand itself. This second address may, in turn, be either the address of the desired operand or another indirect address; the latter is called multilevel indirect addressing.

Control Storage. This entry provides an indication of the microprogrammability of the system. Control storage controls microcode execution in the central processor and is not available to user programs.

Extended Precision Floating Point. Expanded floating point precision beyond double precision.

INPUT/OUTPUT CONTROL

Integrated I/O Channels. These are normally in an integrated I/O processor that contains and controls channels. The channels can generally be configured for either byte- or block-multiplexer operation.

Other I/O Channels. The types of channels available are selector and multiplexer channels. It is becoming more common for channel units to be small programmed processors to permit extension of the channel functions. Burroughs systems use microprogrammed data link processors.

Maximum I/O Data Rate. The maximum rate at which data can be transferred to or from main storage.

COMMUNICATIONS

Maximum Number of Lines. Number of data communications lines supported by the system.

Synchronous. All equipment in the system is in step. That is, the data characters and bits are transmitted at a fixed time interval.

Asynchronous. This implies there is no regular time relationship as with synchronous. The time intervals may be of unequal length.

Protocols Supported. This entry indicates which of the common data communications protocols are supported. A protocol is a set of conventions on the format and contents of messages to be exchanged.

Network Architecture Supported. The standardized data communications network architectures supported by a system are listed.

PERIPHERAL EQUIPMENT

Most mainframe vendors offer a variety of peripheral equipment. Summarized in the comparison charts are the characteristics of disk drives, tape drives, and printers. Additional peripherals are also listed, if available.

Disk Drives. The comparison charts detail the minimum and maximum capacity per disk drive cabinet. ▷

All About Mainframes

▷ **Magnetic Tape Drives.** We list the transfer rate in thousands of bytes per second (KBS) of tape drives that accommodate industry-standard magnetic tape, minimum and maximum speeds are given.

Line Printers. Minimum and maximum printer speeds are listed in lines per minute (lpm).

Other Peripheral Devices Supported. Listed here are other types of equipment available which can be attached to the system. Including OCR, card equipment, plotters, and terminals.

SOFTWARE

All manufacturers, except the plug-compatible vendors, offer their own operating systems. Most of the vendors also offer database management systems, other systems software, and applications software.

Operating Systems. The systems software which controls the overall operation of a multipurpose mainframe. Some vendors offer multiple operating systems for their mainframes.

Programming Languages. The major programming languages in the marketplace today are Cobol, Fortran, Basic, and PL/1. Some systems use a proprietary language available from the vendor for the particular system.

Database Management System. The DBMS organizes data elements in some predefined structure and keeps track of the relationships among the data elements, thereby facilitating information retrieval and report generation.

PRICING AND AVAILABILITY

Purchase Price, Basic System. This entry provides a price range for a basic system and is not intended to represent all of the configurations possible. Prices are only intended to give readers an indication of whether the power they are considering falls into the low, medium, or high ranges. In some cases, systems will cross ranges depending on how they are configured. For a detailed breakdown, the reader is referred to the system reports indicated at the bottom of each column. However, these charts will assist the reader in screening what systems are available from the various manufacturers in equivalent ranges.

Competitively, system prices tend to cluster themselves. There may be some apparent discrepancies in systems screened, but this will generally be because of what a manufacturer includes as part of the basic system price. For example, one manufacturer may include an I/O processor in the basic price, another may not. The reader is cautioned to use a price range only for the initial screening of systems.

Monthly Maintenance, Prime Shift. This normally includes service by the manufacturer for a 5-day workweek. An additional charge is normally made for 7-day, 24-hour service.

Monthly Rental, 1-Year Lease. The manufacturer's charge for a basic system on a monthly basis. If maintenance service is not included, it is indicated.

Purchase Price of Memory Increment. Purchase price for the memory increment listed under the Main Storage heading.

Date of First Delivery. The date when the first production model was delivered (or is scheduled to be delivered) to a customer.

Number Installed to Date. Shows approximately how many systems of each type have been delivered to customers.

Comments

This final entry on the comparison charts is used to explain or amplify the preceding entries and to provide other qualifying, pertinent information about each system.

VENDORS

Listed below are the complete addresses and telephone numbers offo the vendors whose mainframes are listed in the accompanying comparison tables.

Amdahl Corporation, 1250 East Arques Avenue, Sunnyvale, CA 94086. Telephone (408) 746-6000.

Burroughs Corporation, Burroughs Place, Detroit, MI 48232. Telephone (313) 972-7000.

Control Data Corporation, 8100 34th Avenue South, P.O. Box 0, Minneapolis, MN 55440. Telephone (612) 853-8100.

Cray Research, Inc., 1440 Northland Drive, Mendota Heights, MN 55120. Telephone (612) 452-6650.

ETA Systems, 1450 Energy Park Drive, St. Paul, MN 55108. Telephone (612) 642-3400.

Formation, Inc., 823 Eastgate Drive, Mt. Laurel, NJ 08054. Telephone (609) 234-5020.

Honeywell Information Systems, Inc., 200 Smith Street, Waltham, MA 02154. Telephone (617) 895-6000.

International Business Machines Corporation, Old Orchard Road, Armonk, New York. Contact your local IBM representative.

IPL Systems, Inc., 360 Second Avenue, Waltham, MA 02154. Telephone (617) 890-6620.

National Advanced Systems, 800 East Middlefield Road, Mountain View, CA 94042. Telephone (415) 962-6000.

NCR Corporation, 1700 South Patterson Boulevard, Dayton, OH 45479. Telephone (513) 445-4145.

Sperry Corporation, P.O. Box 500, Blue Bell, PA 19424. Telephone (215) 542-4213. □

All About Mainframes

MANUFACTURER AND MODEL	Amdahl 580 Series	Amdahl 580 Series	Burroughs Corp. B 3965	Burroughs Corp. V Series
MODELS	5840, 5850, 5860, 5867, 5868, 5870, 5880	5890-200, 5890-300, 5890-600	B 3965	V 310, V 340, V 380
SYSTEM CHARACTERISTICS				
Number of CPUs	1-2	2-4	1-4	1
Number of I/O processors	1-4	1-4	1-2	1-2
Virtual storage capability	Yes	Yes	Yes	Yes
Plug-compatible with	IBM 308X, 370 systems	IBM 3090, 308X	Not applicable	Not applicable
MAIN STORAGE				
Type	Dynamic NMOS	256K-bit, NMOS	64K-bit MOS	256K-bit MOS
Cycle time, nanoseconds	280	—	—	—
Access time, nanoseconds	120	—	571 (read)	—
Bytes fetched per cycle	8	8	4	—
Minimum capacity, bytes	16M	64M	2M	5M
Maximum capacity, bytes	256M	512M	5M	20M
Increment size, bytes	8M, 16M, 32M, 64M	32M, 64M, 128M	1M, 3M	5M
Interleaving	8-way	8-way	Not applicable	2-way, 4-way
BUFFER STORAGE				
Type	Bipolar RAM	Bipolar RAM	Not applicable	Not applicable
Cycle time, nanoseconds	—	—	—	—
Bytes fetched per cycle	32	32	—	—
Capacity, bytes	64K	96K	—	—
CENTRAL PROCESSOR				
Machine cycle time, nanoseconds	23.5	15	143	110
Word length, bits	32	64	32	48
Number of instructions	S/370 Universal Set	S/370 Universal Set	Contact vendor	Contact vendor
General registers	16	16	Not applicable	—
Addressing	Direct and indirect	Direct and indirect	Direct, indirect, index	Direct, indirect
Control storage	Distributed	Distributed	—	—
Extended precision floating point	Yes	Yes	—	Yes
INPUT/OUTPUT CONTROL				
Integrated I/O channels	16-48	32-160	Not applicable	Not applicable
Other I/O channels	—	—	DLPs[1] up to 32	DLPs[1] up to 64
Maximum I/O data rate, bytes/sec.	3M	3M	7M aggregate	8M
COMMUNICATIONS				
Maximum number of lines	352	352	320-1280	320-1280
Synchronous	Yes	Yes		
Asynchronous	Yes	Yes		
Protocols supported	SDLC, BSC, async, X.25	SDLC, BSC, Async, X.25	Poll select, BDLC, Bisync	Poll select, BDLC, Bisync
Network architectures supported	SNA	SNA	BNA	BNA
PERIPHERAL EQUIPMENT				
Disk drives	Can support all IBM 370	Can support all IBM 308X	252M-542M bytes	252M-868M
Magnetic tape drives	308X devices,	and 3090 devices,	80KBS-1250KBS	80KBS-1250KBS
Line printers	OEM, or plug-compatible	OEM, or plug-compatible	650-2000 lpm	650-2000 lpm
Other peripheral devices supported	—	—	Microfilmer, card equipment, reader/sorter, terminals	Card equipment, reader/sorter, terminals
SOFTWARE				
Operating systems	MVS/370, MVS/XA, VM/SP, HPO	MVS/370, MVS/XA, VM/SP, HPO, VM/XA	MCP-IX	MCP-IX, MCP/VS 1.0
Programming languages	Cobol, Fortran, PL/1, Basic, APL, RPG, all MVS/VM supported	Cobol, Fortran, PL/1, Basic, APL, RPG, all MVS/VM supported	Cobol, RPG II, Fortran, Basic, Pascal, Linc, BPL	Cobol, RPG II, Fortran, Basic, Pascal, Algol, Linc
Data base management system	IMS, DB/DC, all other IBM-compatible stystems	Support IMS, DB/DC, all other IBM-compatible systems	DMS-II	DMS-II
PRICING & AVAILABILITY				
Purchase price, basic system, $	1,270,000-3,180,000	3,825,000-8,500,000	120,000	160,000-702,600
Monthly maintenance, prime shift, $	8,200-17,600	15,250-27,400	634	1,405-1,520
Monthly rental, 1-year lease, $ (including maintenance)	108,330-294,170	354,170-777,500	Not applicable	20,378-36,044
Purchase price of memory incre., $	—	—	Not applicable	10,000
Date of first delivery	August 1982	October 1985	2nd quarter 1986	4th quarter 1985
Number installed to date	—	—	Not available	Not available
COMMENTS		Integrated vector processor feature	[1]Data Link Processor	[1]Data Link Processor Ref.: 70C-117MM-301
	Ref.: 70C-035MM-101	Ref.: 70C-035MM-101	Ref.: 70C-117MM-201	

All About Mainframes

MANUFACTURER AND MODEL	Burroughs Corp. A 5	Burroughs A 12	Burroughs Corp. A 2 and A 3	Burroughs Corp. A 9 and A 10
MODELS	A 5 Model F	A 12	A 2, A 3 Models D, E, F, and K	A 9 Models D and F, A 10 Models D, F, and H
SYSTEM CHARACTERISTICS				
Number of CPUs	1	1	1-2	1-2
Number of I/O processors	2-4	2-4	1-2	2-4
Virtual storage capability	Yes	Yes	Yes	Yes
Plug-compatible with	Not applicable	Not applicable	Not applicable	Not applicable
MAIN STORAGE				
Type	256K-bit MOS	256K-bit MOS	256K-bit MOS	64K (A 9), 256K (A 10) MOS
Cycle time, nanoseconds	150	—	150	—
Access time, nanoseconds	150	—	150	860
Bytes fetched per cycle	6	—	6	—
Minimum capacity, bytes	6M	24M	3M	6M
Maximum capacity, bytes	24M	96M	48M	96M
Increment size, bytes	3M	24M	3M	6M, 12M
Interleaving	2-way	4-way	Yes	Yes
BUFFER STORAGE				
Type	Not applicable	Cache	Not applicable	—
Cycle time, nanoseconds	—	—	—	—
Bytes fetched per cycle	—	—	—	2-6
Capacity, bytes	—	1K words	—	6K-12K
CENTRAL PROCESSOR				
Machine cycle time, nanoseconds	—	62.5	—	72.5
Word length, bits	48	48	48	48
Number of instructions	—	—	—	250+
General registers	32	32	32	—
Addressing	Direct, indirect	Direct, indirect	Direct and indirect	Direct and indirect
Control storage	16K words	Yes	Yes	Yes
Extended precision floating point	Yes	Yes	Yes	Yes
INPUT/OUTPUT CONTROL				
Integrated I/O channels	Not applicable	Not applicable	Not applicable	Not applicable
Other I/O channels	DLPs[1] up to 16	DLPs[1] up to 36	DLPs[1] up to 16	DLPs[1] Up to 80
Maximum I/O data rate, bytes/sec.	3.4M	3M	3.4M	3M
COMMUNICATIONS				
Maximum number of lines	64	32	120	144-288
Synchronous	—	—	—	—
Asynchronous	—	—	—	—
Protocols supported	Programmable	Poll select, BDLC	Programmable	Programmable
Network architectures supported	BNA	BNA	BNA	BNA
PERIPHERAL EQUIPMENT				
Disk drives	122.8M-10G	252M-10G	122.8M-1G	130M-10G
Magnetic tape drives	80KBS-200KBS	120KBS-1250KBS	80KBS-200KBS	120KBS-1250KBS
Line printers	650-1200 lpm	1200-2000 lpm	650-1250 lpm	650-2000 lpm
Other peripheral devices supported	Card equipment, terminals	Card equipment, terminals, laser printers	Card equipment, terminals, laser printers	Card equipment, terminals laser printers
SOFTWARE				
Operating systems	MCP/AS	MCP/AS	MCP/AS	MCP, MCP/AS
Programming languages	Cobol, RPG II, Fortran, Basic, Pascal, Linc, Algol	Cobol, RPG II, Fortran, Basic, Pascal, Linc, Algol	Cobol, Fortran, PL/1, Linc, Pascal, Basic, RPG, Algol	Cobol, Fortran, PL/1, Linc, Pascal, Basic, RPG, Algol
Data base management system	DMS II	DMS-II	DMS II	DMS II
PRICING & AVAILABILITY				
Purchase price, basic system, $	224,000	1,400,000	60,000-200,000	368,815-962,000
Monthly maintenance, prime shift, $	—	3,088.50	453-812	1,150-1,595
Monthly rental, 1-year lease, $ (including maintenance)	—	79,472	5,494-11,418	25,106-50,461
Purchase price of memory incre., $	6,000 (1M)	288,000 (24M)	18,000 (3M)	80,000 (12M)
Date of first delivery	3rd quarter 1986	3rd quarter 1986	November 1984	January 1984
Number installed to date	—	—	—	—
COMMENTS	[1]Data Link Processors Ref: 70C-117MM-351	[1]Data Link Processor Ref.: 70C-117MM-601	[1]Data Link Processor A 2 is a single processor, single model system Re.: 70C-117MM-151	[1]Data Link Processor, the A 10 H dual-processor can be partitioned to form two independent systems Ref.: 70C-117MM-401

All About Mainframes

MANUFACTURER AND MODEL	Burroughs Corp. B 7900 Series	Burroughs Corp. A 15	Control Data Corp. Cyber 180	Control Data Corp. Cyber 180
MODELS	B 7900 Models E, F, DE, H, K, and M	A 15 Models F, H, I, J, K, L, M, and N	810A, 830A, and 830A Dual-CP	840A, 850A, 860A, 870A
SYSTEM CHARACTERISTICS				
Number of CPUs	1-4	1-4	1-2	1-2
Number of I/O processors	1-2	1-2	Up to 30	Up to 30
Virtual storage capability	Yes	Yes	Yes	Yes
Plug-compatible with	Not applicable	Not applicable	Not applicable	Not applicable
MAIN STORAGE				
Type	64K-bit MOS	256K-bit MOS	256K-bit CMOS	256K-bit CMOS
Cycle time, nanoseconds	75 (byte) (read)	—	400	384
Access time, nanoseconds	—	—	1350 (810), 550 (830)	320
Bytes fetched per cycle	—	48	8	8
Minimum capacity, bytes	6M	24M	8M	16M
Maximum capacity, bytes	144M	196M	64M	128M
Increment size, bytes	6M	12M	16M	16M, 32M
Interleaving	8-way	Yes	2-way, 4-way	8-way
BUFFER STORAGE				
Type	Cache	Cache	No applicable	Bipolar
Cycle time, nanoseconds	—	—	—	64
Bytes fetched per cycle	—	—	—	8
Capacity, bytes	24K	48K	—	16K-32K
CENTRAL PROCESSOR				
Machine cycle time, nanoseconds	125	67	50	16
Word length, bits	48	48	64	64
Number of instructions	—	—	64, 131	85, 167
General registers	64	16	24, 32	24, 32
Addressing	Direct and indirect	Direct and indirect	Direct	Direct
Control storage	Not available	Yes	8K 96-bit words	2K 128-bit words
Extended precision floating point	Yes	Yes	Yes	Yes
INPUT/OUTPUT CONTROL				
Integrated I/O channels	Not applicable	Not applicable	8-16	24-34
Other I/O channels	DLPs[1] up to 48	DLPs[1] up to 64	—	—
Maximum I/O data rate, bytes/sec.	8M	8M	3M	3M
COMMUNICATIONS				
Maximum number of lines	256	512	Configuration dependent	Configuration dependent
Synchronous		— 2	2000-56000 bps	2000-56000 bps
Asynchronous		—	1100-9600 bps	1100-9600 bps
Protocols supported	Poll select, BDLC, Bisync	Programmable	X.25 Mode 4, HASP, 2780/3780, async 3270 BSC	X.25 Mode 4, HASP, 2780/3780, async 3270 BSC
Network architectures supported	BNA	BNA	—	—
PERIPHERAL EQUIPMENT				
Disk drives	130M-5.5G	252M-5.5G	402M-2.4G	1.3G-2.4G
Magnetic tape drives	120KBS-780KBS	120KBS-1250KBS	120KBS-1250KBS	120KBS-1250KBS
Line printers	750-2000 lpm	1200-2000 lpm	300-2000 lpm	200-2000 lpm
Other peripheral devices supported	Card equipment, terminals	Card equipment, terminals laser printers	Card equipment, terminals, array processors	Card equipment, terminals array processors
SOFTWARE				
Operating systems	MCP	MCP, MCP/AS	NOS, NOS/VE	NOS, NOS/VE
Programming languages	Cobol, Fortran, Algol, APL, Basic, RPG, PL/1, Linc	Cobol, Fortran, PL/1, APL, RPG, Basic, Pascal, Algol, Linc	Fortran, Cobol, APL, Pascal, Basic, C, Lisp PL/1, Algol	Fortran, Cobol, APL, Pascal, Basic, C, Lisp, PL/1, Algol
Data base management system	DMS-II	DMS-II	IM/VE, TOTAL, DMS 170, IMF	IM/VE, TOTAL, DMS 170, IMF
PRICING & AVAILABILITY				
Purchase price, basic system, $	1,000,000-4,600,000	2,290,000-8,435,000	121,000-252,000	580,000-1,982,000
Monthly maintenance, prime shift, $	3,681-8,171	3,620-12,080	560-1,135	2,200-5,680
Monthly rental, 1-year lease, $ (including maintenance)	62,500-275,100	147,850-427,870	9,325-19,980	33,740-92,130
Purchase price of memory incre., $	102,000 (6M)	144,000 (12M)	3,500 (1M)	8,000 (1M)
Date of first delivery	3rd quarter 1983	3rd quarter 1985	3rd quarter 1986	May 1985
Number installed to date	Not available	—	—	—
COMMENTS	[1]Data Link Processor	[1]Data Link Processor	Models 810A and 830A are single processor systems	Model 870A is a dual-processor system
	Ref.: 70C-117MM-501	Ref.: 70C-117MM-701	Ref.:70C-238MM-401	

All About Mainframes

MANUFACTURER AND MODEL	Control Data Corp. Cyber 180	Cray Research, Inc. X-MP/1 Series	Cray Research, Inc. X-MP/2 Series	Cray Research, Inc. X-MP/4 Series
MODELS	990E, 995E	X-MP/11, X-MP/12, X-MP/14	X-MP/24, X-MP/28, X-MP/216	X-MP/48, X-MP/416
SYSTEM CHARACTERISTICS				
Number of CPUs	1-2	1	2	4
Number of I/O processors	Up to 30	2-4	2-4	4
Virtual storage capability	Yes	—	—	—
Plug-compatible with	Not applicable	Not applicable	Not applicable	Not applicable
MAIN STORAGE				
Type	Bipolar	MOS	MOS	ECL Bipolar
Cycle time, nanoseconds	64	76	76	38
Access time, nanoseconds	208	162	133	133
Bytes fetched per cycle	8	48-64	48-64	64
Minimum capacity, bytes	16M	8M	32M	64M
Maximum capacity, bytes	128M	32M	128M	128M
Increment size, bytes	16M	Not applicable	Not applicable	—
Interleaving	32-way	16-way, 32-way	16-way, 32-way	64-way
BUFFER STORAGE				
Type	Bipolar	Not applicable	Not applicable	Not applicable
Cycle time, nanoseconds	16	—	—	—
Bytes fetched per cycle	8	—	—	—
Capacity, bytes	32K	—	—	—
CENTRAL PROCESSOR				
Machine cycle time, nanoseconds	16	9.5	9.5	9.5
Word length, bits	64	64	64	64
Number of instructions	85, 167	128	128	128
General registers	24, 32	156	309	407
Addressing	Direct	Direct	Direct	Direct
Control storage	1280 101-bit words	Not applicable	Not applicable	Not applicable
Extended precision floating point	Yes	—	—	—
INPUT/OUTPUT CONTROL				
Integrated I/O channels	29-34	4-7	7	10
Other I/O channels	—	—	—	—
Maximum I/O data rate, bytes/sec.	3M	446M aggregate	1346M aggregate	2346M aggregate
COMMUNICATIONS				
Maximum number of lines	Configuration dependent	See comments	See Comments	See comments
Synchronous	2000-56000 bps	—	—	—
Asynchronous	1100-9600 bps	—	—	—
Protocols supported	X.25 Mode 4, HASP, 2780/3780, async 3270 BSC	Cray	Cray	Cray
Network architectures supported	—	NSC (local)	NSC (local)	NSC (local)
PERIPHERAL EQUIPMENT				
Disk drives	1.3G-2.4G	1.2G	1.2G	1.2G
Magnetic tape drives	160KBS-1250KBS	Not supplied	Not supplied	Not Supplied
Line printers	300-2000 lpm	Not supplied	Not supplied	Not Supplied
Other peripheral devices supported	Card equipment, terminals array processors	Solid-state storage device	Solid-state storage device	Solid-state storage device
SOFTWARE				
Operating systems	NOS, NOS/VE	COS, Unicos	COS, Unicos	COS, Unicos
Programming languages	Fortran, Cobol, APL, Pascal, Basic, C, Lisp, PL/1, Algol	Fortran, Pascal, C, CAL	Fortran, Pascal, C, CAL	Fortran, Pascal, C, CAL
Data base management system	IM/VE, TOTAL, DMS 170, IMF	Not supplied	Not supplied	Not supplied
PRICING & AVAILABILITY				
Purchase price, basic system, $	2,350,000-3,815,000	5,000,000-8,000,000	8,500,000-11,500,000	14,000,000-16,000,000
Monthly maintenance, prime shift, $	9,000-14,000	Contact vendor	Contact vendor	Contact vendor
Monthly rental, 1-year lease, $ (including maintenance)	134,000-208,000	Contact vendor	Contact vendor	Contact vendor
Purchase price of memory incre., $	20,000 (1M)	Contact vendor	Contact vendor	Contact vendor
Date of first delivery	January 1985	July 1984	July 1983	July 1984
Number installed to date	—	—	—	—
COMMENTS	Model 995E is dual-processor system	Attach to channels of IBM, CDC, DEC, Honeywell, Sperry, and Amdahl systems	Attach to channels of IBM, CDC, DEC, Honeywell, Sperry, and Amdahl systems	Attach to channels of IBM, CDC, DEC, Honeywell, Sperry, and Amdahl systems
		Ref.: 70C-245EW-101	Ref.: 70C-245EW-101	Ref.: 70C-245EW-101

All About Mainframes

MANUFACTURER AND MODEL	Cray Research, Inc. Cray-2	ETA Systems CYBER 205	Formation 4000 Series	Honeywell DPS 7 Series
MODELS	Cray-2	Series 600	100, 200, 300, 101, 201, 301	DPS 7/40E, 7/55E, 7/65E
SYSTEM CHARACTERISTICS				
Number of CPUs	4	1	1-2	1
Number of I/O processors	1 (foreground processor)	1	Bus Structure[1]	—
Virtual storage capability	—	2^{47} bits	Yes	Yes
Plug-compatible with	Not applicable	—	370 byte multiplexer	Not applicable
MAIN STORAGE				
Type	MOS	16K SRAM	NMOS	64K-bit, 256K-bit MOS
Cycle time, nanoseconds	—	80	800	355 (read)
Access time, nanoseconds	—	120	200	250
Bytes fetched per cycle	—	64	4	4
Minimum capacity, bytes	2G	8×10^6	256K-1M	2M
Maximum capacity, bytes	2G	128×10^6	8M	8M
Increment size, bytes	Not applicable	8×10^6	256K, 1M	1M, 2M
Interleaving	—	8 banks x 64	Not applicable	Not applicable
BUFFER STORAGE				
Type	—	—	Not applicable	Not applicable
Cycle time, nanoseconds	—	—	—	—
Bytes fetched per cycle	—	—	—	—
Capacity, bytes	128K	—	—	—
CENTRAL PROCESSOR				
Machine cycle time, nanoseconds	4.1	20	200	360, 240, 140
Word length, bits	64	64	32 & byte parity	32
Number of instructions	—	223	176 & 370VM assist	221
General registers	28 (per CPU)	256	16	30
Addressing	Direct	Virtual 2^{47} bits	Direct and indirect	Indirect
Control storage	Not applicable	4K (64-bit words)	8K words of 64 bits each	48K bytes
Extended precision floating point	—	96 bit	Yes	Yes
INPUT/OUTPUT CONTROL				
Integrated I/O channels	4	16	Bus structure	2-8
Other I/O channels	—	Front-end dependent	Byte multiplexer	
Maximum I/O data rate, bytes/sec.	4 gigabit	25M per channel	5M	1.2M-1.8M
COMMUNICATIONS				
Maximum number of lines	See Comments	—	100	12-255
Synchronous	—	—	20[3]	—
Asynchronous	—	—	96[3]	—
Protocols supported	Cray	—	BSC, SDLC, Async	HDLC, sync, async
Network architectures supported	NSC (local)	CDC LCN	SNA	DSA
PERIPHERAL EQUIPMENT				
Disk drives	1.2G	64	70M-635M	300M-1200M
Magnetic tape drives	Not supplied	128	72KBS-200KBS[2]	70KBS-781KBS
Line printers	Not supplied	—	300-1000 lpm	600-1600 lpm
Other peripheral devices supported	Solid-state storage device	—	Diskette, card reader, IBM 370 byte multiplexer	Diskette drives, terminals, card equipment
SOFTWARE				
Operating systems	Unicos	Virtual storage operating system (VSOS)	DOS/VS, DOS/VSE, OS/VS1, MVS, VM/370, VM/SP	GCOS 7, GCOS 64
Programming languages	Fortran, C, CAL	Fortran, IMPL, META, Pascal	Cobol, Fortran, PL/1, RPG II, APL	Cobol, Fortran, RPG, PL/1, Pascal, Basic, GPL, APL
Data base management system	Not supplied	—	TMS, 370 compatible	I-D-S/II
PRICING & AVAILABILITY				
Purchase price, basic system, $	17,000,000	5,650,000	47,000-97,400	89,000-160,000
Monthly maintenance, prime shift, $	Contact vendor	30,000	150-541	210-562
Monthly rental, 1-year lease, $ (including maintenance)	Contact vendor	176,700	Not available	4,660-9,408
Purchase price of memory incre., $	Contact vendor	750,000 (10^6 words)	3300 for 256K to 10,000 for 1MB	10,000 (1M)
Date of first delivery	4th quarter 1985	June 1981	February 1981	January 1984
Number installed to date	—	—	95	—
COMMENTS	Attach to channels of IBM, CDC, DEC, Honeywell, Sperry, and Amdahl systems	The Cyber 205 was formerly marketed by Control Data	[1]I/O Processor functions provided in integrated control units, up to 22 controllers maximum [2]1000 bits/second [3]Combinations are restricted by hardware configurations	
	Ref.: 70C-245EW-101			Ref.: 70C-458MM-301

NOVEMBER 1986

All About Mainframes

MANUFACTURER AND MODEL	Honeywell DPS 8 Series	Honeywell DPS 88 Series	Honeywell DPS 90 Series	International Business Machines Corp. 4300 Series
MODELS	DPS 8/47, 8/49, 8/52, 8/62, 8/70	DPS 88/861, /862, 862T, /891, /892, /892T	DPS 90/91, /92, /92T, /93, /94,	4361 Model Group 3, 4, and 5
SYSTEM CHARACTERISTICS				
Number of CPUs	1-6	1-2	1-4	1
Number of I/O processors	1	1-2	1-4	1
Virtual storage capability	Yes	Yes	Yes	Yes
Plug-compatible with	Not applicable	Not applicable	Not applicable	Not applicable
MAIN STORAGE				
Type	64K-bit MOS	256K-bit MOS	256K-bit MOS	MOS
Cycle time, nanoseconds	750	750	—	—
Access time, nanoseconds	225	225	225	—
Bytes fetched per cycle	16	32	32	4
Minimum capacity, bytes	8M	32M	32M	2M
Maximum capacity, bytes	64M	128M	256M	16M
Increment size, bytes	2M	16M	32M	—
Interleaving	4-way	4-way	8-way	—
BUFFER STORAGE				
Type	Cache	Cache	Cache	—
Cycle time, nanoseconds	—	—	—	—
Bytes fetched per cycle	—	—	—	—
Capacity, bytes	32K	32K-128K	128K	8K-16K
CENTRAL PROCESSOR				
Machine cycle time, nanoseconds	—	Not available	Not available	100
Word length, bits	36	36	36	32
Number of instructions	289	316	—	System/370 Universal Set
General registers	140	—	—	—
Addressing	Direct, indirect	Direct, indirect	Direct, indirect	—
Control storage	—	—	—	—
Extended precision floating point	Yes	Yes	Yes	Yes
INPUT/OUTPUT CONTROL				
Integrated I/O channels	—	—	—	—
Other I/O channels	20-54	64-256	16-64	1-2
Maximum I/O data rate, bytes/sec.	4M	2M	3-	3M
COMMUNICATIONS				
Maximum number of lines	—	2048	—	8
Synchronous	—	—	—	—
Asynchronous	—	—	—	—
Protocols supported	BISC, HDLC, sync, async	BISC, HDLC, sync, async	BISC, HDLC, sync, async	BSC, SDLC, Start/Stop
Network architectures supported	DSA	DSA	DSA	SNA
PERIPHERAL EQUIPMENT				
Disk drives	157M-1.8G	157M-1.8G	157M-1.8G	64.5M-5.04G bytes
Magnetic tape drives	100KBS-1250KBS	52KBS-1250KBS	52KBS-1250KBS	60KBS-3000KBS
Line printers	900-1600 lpm	1200-1600 lpm	900-1325 lpm	325-3600 lpm
Other peripheral devices supported	Card equipment, document handler, page printers	Card equipment, terminals, page printers	Card equipment, terminals	Card equipment, terminals, laser printers, magnetic and optical readers
SOFTWARE				
Operating systems	GCOS 8, CP-6, Multics, GCOS	GCOS 8	GCOS 8	DOS/VSE, VM/370, MVS/370, VM/SP, OS/VS1, IX/370, SSX/VSE
Programming languages	Cobol, Fortran, Basic, B, C, PL/1, RPG, Pascal, APL, GMAP, GPS, Simscript, Lisp	Cobol, Fortran, Basic, B, C, Pascal, APL, PL/1, GMAP, GPSS, Simscript, Lisp, RPG	Cobol, Fortran, Basic, B, C, Pascal, APL, PL/1, GMAP, GPSS, Simscript, Lisp, RPG	Pascal/VS, Fortran, Basic, VS APL, PL/1, Cobol, RPG II
Data base management system	I-D-S/II, DM-IV	I-D-S/II, DM-IV	I-D-S/II, DM-IV	DB2, DL/1, SQL/DS
PRICING & AVAILABILITY				
Purchase price, basic system, $	153,000-700,000	1,750,000-4,510,000	3,950,000-8,350,000	56,500-279,700
Monthly maintenance, prime shift, $	500-3,000	4,000-8,650	6,250-11,750	318-1,030
Monthly rental, 1-year lease, $ (including maintenance)	8,800-44,715	86,400-218,400	246,875-521,875	4,075-22,430
Purchase price of memory incre., $	20,000-40,000 (2M)	260,000 (16M)	400,000 (32M)	—
Date of first delivery	2nd quarter 1980	3rd quarter 1983	2nd quarter 1985	1st quarter 1984
Number installed to date	—	—	—	—
COMMENTS	CP-6 operating system available on the 5 DPS 8C models, Multics operating system available on the DPS 8/70C Ref.: 70C-458MM-501	The models DPS 88/862T and /892T are fully redundant systems Ref.: 70C-458MM-701	The model DPS 90/92T is a fully redundant system Ref.: 70C-458MM-701	Ref.: 70C-504MK-301

All About Mainframes

MANUFACTURER AND MODEL	International Business Machines Corp. 4300 Series	International Business Machines Corp. 308X Series	International Business Machines Corp. 3090 Series	IPL Systems, Inc. 4400 Series
MODELS	4381 Model Group 11, 12, 13, and 14	3083 CX, EX, BX, JX; 3081 GX, KX; 3084 QX	150, 180, 200, 400	4460 and 4480
SYSTEM CHARACTERISTICS				
Number of CPUs	1-2	1-4	1-4	1-2
Number of I/O processors	1-2	1-4	—	—
Virtual storage capability	Yes	Yes	Yes	Yes
Plug-compatible with	Not applicable	Not applicable	Not applicable	S/370 and 4300 Series
MAIN STORAGE				
Type	MOS	64K-bit MOS	288K-bit MOS	64K-bit NMOS
Cycle time, nanoseconds	—	312 (read)	—	500
Access time, nanoseconds	—	—	—	500
Bytes fetched per cycle	8	8	—	8
Minimum capacity, bytes	4M	8M-32M	32M	4M
Maximum capacity, bytes	32M	16M-128M	128M	16M
Increment size, bytes	—	8M, 16M, 32M	32M (150 and 180 only)	4M
Interleaving	—	2-way, 4-way (3084)	—	—
BUFFER STORAGE				
Type	—	—	—	ECL
Cycle time, nanoseconds	120	—	—	100
Bytes fetched per cycle	8	4	—	4-8
Capacity, bytes	4K-128K	32K-64K	64K-256K	16K-24K
CENTRAL PROCESSOR				
Machine cycle time, nanoseconds	68-56	24	18.5	50
Word length, bits	32	32	288K	32
Number of instructions	System/370 Universal Set	2, 4, 6 bytes	—	S/370 Univ. Inst. Set
General registers	—	—	—	24
Addressing	—	Direct and indirect	Direct and indirect	Direct and indirect
Control storage	—	—	—	64K bytes
Extended precision floating point	Yes	Yes	Yes	Yes
INPUT/OUTPUT CONTROL				
Integrated I/O channels	—	8-48 (1-6 groups of 8)	4-96	—
Other I/O channels	1-10	—	—	1-8
Maximum I/O data rate, bytes/sec.	3M	3M	3M	3M
COMMUNICATIONS				
Maximum number of lines	8	—	255	—
Synchronous	—		—	—
Asynchronous	—		—	—
Protocols supported	—	—	SDLC, BSC	—
Network architectures supported	SNA	SNA	SNA	SNA
PERIPHERAL EQUIPMENT				
Disk drives	64.5M-5.04G bytes	317.5M-5.04G	317.5M-5.04G bytes	Supports all IBM 370, 4300
Magnetic tape drives	60KBS-3000KBS	60KBS-3000KBS	10KBS-3000KBS	and 30xx devices
Line printers	325-3600 lpm	1200-20040 lpm	1200-20040 lpm	OEM or plug-compatible
Other peripheral devices supported	Card equipment, terminals laser printers, magnetic and optical readers	Card equipment, terminals, page printers, magnetic and optical readers	Card equipment, terminals, page printers, magnetic and optical readers	—
SOFTWARE				
Operating systems	DOS/VSE, OS/VS1, MVS/SP, VM/SP, MVS/XA, VM/XA, IX/370	MVS/370, VM/SP, MVS/XA, VM/XA	MVS/SP, MVS/XA, VM/XA, VM/HPO	DOS/VS, DOS/VSE, OS/VS1, SVS, MVS, MVS/SP, SSX/ VSE, VM/370
Programming languages	Pascal/VS, Fortran, Basic, VS APL, PL/1/, Cobol, RPG II	Cobol, Fortran, Basic, APL/2, RPG II, Pascal/VS, Assembler	Cobol, Fortran, PL/1, Basic, RPG II, Pascal/VS, Assembler	Cobol, Fortran, APL, PL/1, Pascal, Algol, RPG, Basic
Data base management system	DB2, DL/1, SQL/DS	IMS/VS-DB, DB2	IMS/VS-DB, DB2	IBM-compatible systems
PRICING & AVAILABILITY				
Purchase price, basic system, $	185,000-855,000	605,000-6,020,000	1,300,000-7,944,000	190,000-503,400
Monthly maintenance, prime shift, $	450-952	1,445-10,990	2,400-11,910	964-1,324
Monthly rental, 1-year lease, $ (including maintenance)	18,780-86,525	47,500-462,130	108,350-728,650	Not applicable
Purchase price of memory incre., $	—	—	270,000 (32M)	—
Date of first delivery	2nd quarter 1986	February 1984	August 1985	2nd quarter 1983
Number installed to date	—	—	—	—
COMMENTS			Optional vector facility available for all models	—
	Ref.: 70C-504MK-301	Ref.: 70C-504MK-602	Ref.: 70C-504MK-701	Ref.: 70C-514KM-101

All About Mainframes

MANUFACTURER AND MODEL	National Advanced Systems (NAS) AS/66XO Series	National Advanced Systems (NAS) AS/80X3 Series	National Advanced Systems (NAS) AS/90X0 Series	National Advanced Systems (NAS) AS/XL Series
MODELS	AS/6620, AS/6630, AS/6650, AS/6660	AS/8023, AS/8043, AS/8053, AS/8063, AS/8083	AS/9040, AS/9050, AS/9060, AS/9070, AS/9080	AS/XL 50, /XL 60, /XL 80, /XL 90, /XL 100
SYSTEM CHARACTERISTICS				
Number of CPUs	1	1-2	1-2	1-4
Number of I/O processors	1	1-2	1-2	1-4
Virtual storage capability	Yes	Yes	Yes	Yes
Plug-compatible with	IBM 4361, 4381, 370 370	IBM 4381, 308X,	IBM 308X,	IBM 308X,3090
MAIN STORAGE				
Type	256K-bit NMOS	256K-bit NMOS	256K-bit NMOS	256K-bit CMOS
Cycle time, nanoseconds	420	360-315	342-270	—
Access time, nanoseconds	—	—	—	—
Bytes fetched per cycle	8	8	8	8
Minimum capacity, bytes	8M	16M	8M	32M
Maximum capacity, bytes	16M	128M	64M	512M
Increment size, bytes	4M, 8M	16M-32M	8M-16M	32M-64M
Interleaving	2-way	4-way, 8-way	8-way, 16-way	16-way
BUFFER STORAGE				
Type	Bipolar RAM	Bipolar RAM	Bipolar RAM	ECL RAM
Cycle time, nanoseconds	50-60	18-20	15-19	—
Bytes fetched per cycle	8	8	8	8
Capacity, bytes	64K	32K-64K	64K-256K	256K
CENTRAL PROCESSOR				
Machine cycle time, nanoseconds	60, 50, 43	35-33	38-30	—
Word length, bits	32	32	32	32
Number of instructions	S/370 Univ. Inst. Set	S/370 Univ. Inst. Set	S/370 AS/370XA	S/370 AS/370XA
General registers	16	16	16	16
Addressing	Direct and indirect	Direct and indirect	Direct and indirect	Direct and indirect
Control storage	—	—	—	—
Extended precision floating point	Yes	Yes	Yes	Yes
INPUT/OUTPUT CONTROL				
Integrated I/O channels	5	24-32	24-48	—
Other I/O channels	1-4	6-32	1-46	Up to 96
Maximum I/O data rate, bytes/sec.	13M aggregate	13M aggregate	96M aggregate	192M aggregate
COMMUNICATIONS				
Maximum number of lines Synchronous	IBM compatible communications controllers	IBM compatible communication controllers	IBM compatible communication controllers	IBM compatible communication controllers
Asynchronous	—	—	—	—
Protocols supported	—	—	—	—
Network architectures supported	SNA	SNA	SNA	SNA
PERIPHERAL EQUIPMENT				
Disk drives	Can support all IBM 4300 and 308X devices	Can support all IBM 4300 and 308X devices	Can support all IBM 4300 and 308X devices	Can support all IBM 308X and 3090 devices
Magnetic tape drives				
Line printers	OEM, or plug-compatible	IBM or plug-compatible	OEM, or plug compatible	OEM, or IBM compatible
Other peripheral devices supported	—		—	—
SOFTWARE				
Operating systems	VS/SP, DOS/VSE, MVS	VM/SP, DOS/VSE, MVS, VM/SP, MVS/XA	VM/SP, MVS, MVS/XA	MVS/XA
Programming languages	Pascal/VS, Cobol, PL/1, Fortran, Basic, APL/VS, Assembler	Pascal/VS, Cobol, PL/1, Fortran, Basic, APL/VS, Assembler	Pascal/VS, Cobol, PL/1, Fortran, Basic, APL/VS, Assembler	Pascal, Cobol, PL/1, Fortran, Basic, APL
Data base management system	IMS, or IBM compatible	IMS, or IBM compatible	IMS, or IBM compatible	IMS, or IBM compatible
PRICING & AVAILABILITY				
Purchase price, basic system, $	255,000-475,000	730,500-2,871,000	1,402,000-3,878,000	3,050,000-12,420,000
Monthly maintenance, prime shift, $	805-1,215	805-7,378	4,288-9,644	—
Monthly rental, 1-year lease, $ (including maintenance)	Contact vendor	Contact vendor	—	—
Purchase price of memory incre., $	38,000 (4M)	95,000 (8M)	190,000 (16M)	394,000 (64M)
Date of first delivery	October 1982	May 1983	August 1982	2nd quarter 1985
Number installed to date	—	—	—	—
COMMENTS			NAS offers the AS/9100 Series, which is the vector processor equivalent to the 90X0 Series	NAS offers the AS/XL V Series, which is the vector processor equivalent to the AS/XL Series
	Ref.: 70C-638XM-201	Ref.: 70C-638XM-201	Ref.: 70C-638MM-201	Ref.: 70-638MM-201

All About Mainframes

MANUFACTURER AND MODEL	NCR Corp. 8500 Systems	NCR Corp. 8600 Systems	NCR Corp. 9800 System	Sperry Corp. 1100/60 System
MODELS	V-8545-IIE, 55-IIE, 65-IIE, 75-IIE, 95-IIE	V-8635, 8645, 8655, 8665, 8675, 8685, 8695	9811, 9821, 9822, 9842, 9863, 9884	1100/61, 1100/62, 1100/63, 1100/64
SYSTEM CHARACTERISTICS				
Number of CPUs	1-4	1-8	1-8 (AP*)	1-4
Number of I/O processors	1-2	4-16	1-4 (DSP**)	1-4
Virtual storage capability	Yes	Yes	Yes	Yes
Plug-compatible with	Not applicable	Not applicable	Not applicable	Not applicable
MAIN STORAGE				
Type	64K-bit MOS	64K-bit MOS	64K-bit ICS	64K-bit MOS
Cycle time, nanoseconds	440	380	120	580
Access time, nanoseconds	370 (read)	370 (read)	360 (read)	625
Bytes fetched per cycle	4-16	4-16	—	—
Minimum capacity, bytes	1M	4M	2M	2M
Maximum capacity, bytes	16M	64M	48M	32M
Increment size, bytes	1M-4M	4M	2M	1M
Interleaving	2-way or 4-way	4-way	—	2-way
BUFFER STORAGE				
Type	Not applicable	Cache memory	Cache (DSP)	IC
Cycle time, nanoseconds	—	76	—	116
Bytes fetched per cycle	—	4-8	—	4-word
Capacity, bytes	—	32K-512K	1M-3M	4K-32K
CENTRAL PROCESSOR				
Machine cycle time, nanoseconds	84-56	38	155 (AP)	116
Word length, bits	32	32	32	36
Number of instructions	108	108	—	161
General registers	64	104-416	—	128
Addressing	Direct and indirect	Direct and indirect	—	Direct and indirect
Control storage	24K-128K bytes	96K-768K	128K	2000 words
Extended precision floating point	—	Yes	—	—
INPUT/OUTPUT CONTROL				
Integrated I/O channels	—	—	8	—
Other I/O channels	Up to 64	16-64	—	2-17
Maximum I/O data rate, bytes/sec.	8M	8M-32M	14M aggregate	—
COMMUNICATIONS				
Maximum number of lines	253	—	18	No fixed limit
Synchronous	—		Yes	
Asynchronous	—		Yes	
Protocols supported	SDLC, BSC, TTY, X.25, 3270	SDLC, BSC, TTY, X.25, 3270	DLC, BMC, TTY, X.25,	UDLC
Network architectures supported	NCR/CNA, SNA	NCR/CNA, SNA	NCR/CNA, SNA	DCA
PERIPHERAL EQUIPMENT				
Disk drives	27M-1092M	91M-1092M	81M-1092M	77M-403M
Magnetic tape drives	120KBS-1250KBS	120KBS-1250KBS	120KBS-1250KBS	40KBS-1250KBS
Line printers	720-2000 lpm	360-2000 lpm	360-2000 lpm	760-2000 lpm
Other peripheral devices supported	Card equipment, MICR, floppy disks, terminals, laser printer	Card equipment, MICR, floppy disks, terminals, laser printer	Terminals,	Card equipment, terminals, diskettes, laser printer
SOFTWARE				
Operating systems	VRX/B3, VRX/MP	VRX	VRX/XE	1100 OS
Programming languages	Cobol 74, VRX Fortran 77, Neat VS, Basic, RPG	Cobol 74, VRX, Fortran 77, Neat VS, Basic, RPG	Cobol 74, NEATVS, C, IVS Basic,	Cobol, Fortran, APL 1100, Pascal, Algol, PL/1, RPG, Macro, Assembler, Mapper
Data base management system	Total	Total	NCR-DMS, Total	UDS 1100, DMS 1100
PRICING & AVAILABILITY				
Purchase price, basic system, $	41,500-170,000	455,000-2,995,000	41,220-340,580	586,100-1,015,416
Monthly maintenance, prime shift, $	294-1,648	2,750-9,000	3,241-20,182	1,808-3,732
Monthly rental, 1-year lease, $ (including maintenance)	4,230-18,225	14,667-98,680	—	13,951-24,175
Purchase price of memory incre., $	7,500-(1M)	80,000 (4M)	11,550 (2M)	—
Date of first delivery	1982	May 1983	Third Quarter 1986	January 1980
Number installed to date	—	—	—	—
COMMENTS	V-8545-IIE does not use interleaving Ref.: 70C-653MM-201	Ref.: 70C-653MM-201	*Application Processor; **Data Storage Processor; The 9800 architecture is designed to separate I/O and application logic processing with function-specific processors Ref.: 70C-653MM-301	Ref.: 70C-846MM-201

All About Mainframes

MANUFACTURER AND MODEL	Sperry Corp. 1100/70 System	Sperry Corp. 1100/90 System		
MODELS	1100/71, 1100/72, 1100/73, 1100/74	1100/91, 1100/92, 1100/93, 1100/94		
SYSTEM CHARACTERISTICS				
Number of CPUs	1-4	1-4		
Number of I/O processors	1-4	1-4		
Virtual storage capability	Yes	Yes		
Plug-compatible with	Not applicable	Not applicable		
MAIN STORAGE				
Type	64K-bit CMOS	64K-bit NMOS		
Cycle time, nanoseconds	580	360		
Access time, nanoseconds	625	660		
Bytes fetched per cycle	—			
Minimum capacity, bytes	2M	8M		
Maximum capacity, bytes	32M	64M		
Increment size, bytes	2M-4M	4M		
Interleaving	—	2-way, 4-way		
BUFFER STORAGE				
Type	IC semiconductor	Cache		
Cycle time, nanoseconds	116	60		
Bytes fetched per cycle	16	8 words		
Capacity, bytes	8K-64K	16K		
CENTRAL PROCESSOR				
Machine cycle time, nanoseconds	116	—		
Word length, bits	36	36		
Number of instructions	161	271		
General registers	128	128		
Addressing	Direct and indirect	Direct and indirect		
Control storage	2000 words	—		
Extended precision floating point	—	Not available		
INPUT/OUTPUT CONTROL				
Integrated I/O channels	—	4-256		
Other I/O channels	3-17			
Maximum I/O data rate, bytes/sec.	6.3M aggregate	35.2M aggregate		
COMMUNICATIONS				
Maximum number of lines	No fixed limit	No fixed limit		
Synchronous				
Asynchronous				
Protocols supported	UDLC	UDLC		
Network architectures supported	DCA	DCA		
PERIPHERAL EQUIPMENT				
Disk drives	1.17M-403M	17.2M-358.4M		
Magnetic tape drives	60KBS-1250KBS	60KBS-1250KBS		
Line printers	760-2000 lpm	800-2000 lpm		
Other peripheral devices supported	Card equipment, terminals, diskette, laser printer	Card equipment, terminals, diskettes, laser printer		
SOFTWARE				
Operating systems	1100 OS	1100 OS		
Programming languages	Cobol, Fortran, RPG, PL/1, Mapper, Basic	Cobol, Fortran, Algol, Basic, Pascal, PL/1, APL, RPG, Assembly, Mapper		
Data base management system	UDS 1100	UDS 1100		
PRICING & AVAILABILITY				
Purchase price, basic system, $	188,000-213,520	2,005,962-5,000,000		
Monthly maintenance, prime shift, $	1,070-1,855	4,996-14,034		
Monthly rental, 1-year lease, $ (including maintenance)	5,250-6,885	80,937-208,334		
Purchase price of memory incre., $	24,320 (2M)	—		
Date of first delivery	June 1983	December 1983		
Number installed to date	—	—		
COMMENTS				
	Ref.: 70C-846MM-301	Ref.: 70C-846MM-501		