All About Plug-Compatible Mainframes

Plug-compatible mainframes offer attractive alternatives to IBM's medium- and large-scale computer systems. This report discusses the pros and cons of installing a PCM, profiles the current PCM suppliers, and provides detailed comparison charts describing 42 systems from 6 vendors.

The plug-compatible mainframe (PCM) industry was launched seven years ago with the installation of the first Amdahl 470V/6 system. Since that time, a number of other vendors have successfully competed for a share of the market. The primary thrust of the PCM manufacturers has been to provide cost-effective alternatives to the IBM System/370, 303X Series, 3081, and 4300 Series computers.

Plug-compatible mainframes can be installed easily, can replace or augment IBM mainframes with little or no need for changes in software or operating procedures, and can be expected to perform reliably and efficiently. What's more, most of the PCM suppliers have demonstrated their ability to provide first-class field maintenance and software support.

Should your organization install a PCM? And if so, which one? This report is designed to help you answer those questions by assessing the pros and cons of PCM's in general, profiling their current suppliers, and presenting the characteristics of 42 PCM's from 6 vendors in detailed comparison charts.

The PCM Concept

Plug-compatible mainframes are typically defined as computer mainframes that can directly execute all application programs and systems software written for the IBM System/370, 303X Series, 308X Series, and/or 4300 Series computers and can utilize the peripheral equipment available for these computers. The PCM concept would, of course, be equally applicable to the computers made by Burroughs, Honeywell, Univac, or any other mainframe supplier. IBM, with its large user base, attracts the most serious attention from the PCM vendors. Two manufacturers, Telefile Computer Products (Irvine, CA) and Foonly, Inc. (Mountain View, CA), have developed systems that are compatible with non-IBM product lines. Telefile's T-85 is compatible with the Xerox Sigma family of systems, while Foonly's F1 through F5 systems are compatible with the Digital Equipment DECsystem-10 and DECSYSTEM-20 families.

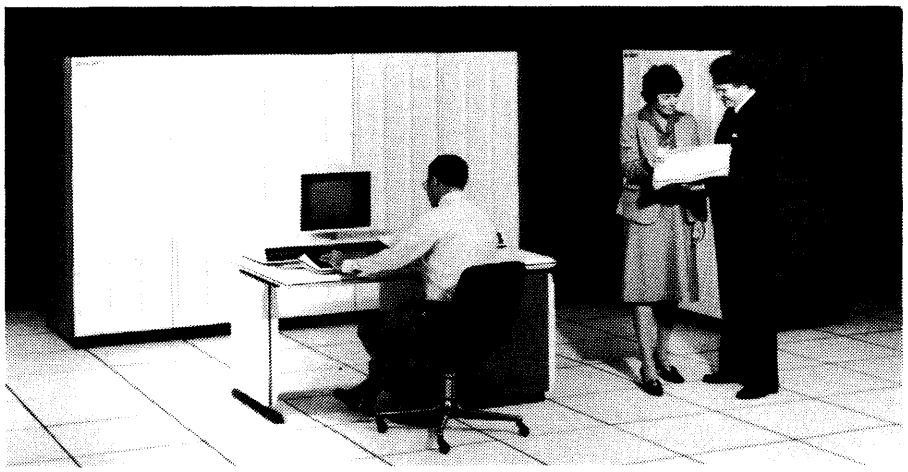
The PCM industry resulted from the convergence of two important trends:

- The widespread availability and user acceptance of plug-compatible peripherals designed to directly replace IBM's own magnetic tape units, disk storage units, printers, terminals, and even main memory units. From there, the next logical step was to offer replacements for the IBM central processors themselves.

- The acknowledgement that the IBM System/360 and System/370 instruction set has become a de facto standard for the industry, and that most IBM computer users will not seriously consider switching to a computer that requires extensive reprogramming. A number of systems were developed in the 60's by RCA and Univac which used the System/360 instruction set but were incompatible with systems software and peripherals. The next logical step, which was first taken by Amdahl Corporation, was to build computers which exhibited total functional compatibility with the IBM mainframes and could use all the same software and peripheral equipment.

To date, Amdahl, and a host of others, have proven the viability of the PCM concept, and it appears the industry will play an important role in the 1980's.

The current trend in the PCM industry is to target a family of systems toward a specific IBM product line, rather than ➢



Amdahl, the original PCM supplier, offers two IBM-compatible computer families: the 470 Series and the 580 Series. The 580 Series was announced in November 1980 as a replacement for IBM's 3081 processor. The 580 Series consists of the single-processor 5860 (shown here) and the dual-processor 5870 and 5880. The 580 Series processors feature from 16 to 32 megabytes of main memory and from 16 to 34 I/O channels per CPU.

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be all things to all users. For example, Amdahl Corporation pits its 470 and 580 Series against IBM's high-end systems, the System/370 and 303X Series, and the 3081, respectively. Firms like Cambex, IPL Systems, and Magnuson compete with IBM's popular 4300 Series. Storage Technology Corporation, a maker of plug-compatible peripherals, has announced its intention to enter the PCM market to compete in the large mainframe arena. A new company, Trilogy, formed by Amdahl founder Gene Amdahl, intends to develop systems to compete in the 303X Series range. With high technology costs and the costs associated with maintenance and software support to consider, it is eminently more practical for a manufacturer to concentrate on a particular IBM product line. The various manufacturers and their product lines appear to bear this out.

User Reaction

Four PCM manufacturers—Amdahl, IPL, Magnuson, and NAS—were represented in Datapro's 1982 survey of computer users. We received a total of 45 responses from Ahdahl 470 Series users, 29 responses from Magnuson M80 Series users, 11 responses from NAS AS/5000, AS/7000, and AS/9000 users, and 8 responses from IPL 4400 Series users.

Using Datapro's 14 rating criteria and our usual scale of 4.0 for Excellent, 3.0 for Good, 2.0 for Fair, and 1.0 for Poor, we've compiled the weighted average ratings these users have assigned to their systems, and present the results in the chart below.

For comparison we've also included the weighted averages of the IBM system families the PCMs compete with, the System/370 (313 responses), 4300 (785 responses), 303X (271 responses), and 3081 (27 responses).

As you can see, the user ratings earned by the PCM vendors once again compared favorably with those of IBM in all 14 categories. The PCM vendors were rated comparable to or above IBM in key categories like overall satisfaction, ease of conversion, technical support, and both responsiveness and effectiveness of maintenance service. Equipment reliability was essentially a stand-off between IBM and the PCM's, with all the parties earning high ratings. Thus, it seems clear that a wisely chosen PCM can yield worthwhile cost savings without imposing offsetting penalties in any of the other areas that help to determine overall user satisfaction.

PCM Pros and Cons

The first and foremost advantage of plug-compatible mainframes is, of course, the prospect of substantial *increases in processing power per dollar.* The user can elect to realize this price/performance gain in either of two distinct ways: 1) by choosing a PCM that delivers performance comparable to that of a certain IBM mainframe but is offered at a lower price; or 2) by choosing a PCM that has a price tag comparable to that of a certain IBM mainframe but offers more processing power. The PCM vendors tend to position their product offerings so that users can elect either approach or, in some cases, a combination of the two (i.e., somewhat more power at a somewhat lower cost).

Faster delivery is another advantage that the PCM vendors will enjoy over IBM for at least another year or so. The slow delivery schedule of IBM's 4300 and 303X systems generated many sales opportunities for the PCM vendors, who typically could ship a system 30 to 60 days ARO. This situation is gradually diminishing, however, especially in the very large system arena. IBM's 3081 processor, the first in the H-Series, was scheduled for shipment late in 1981. Of its two announced competitors, the NAS AS/9000DPC was scheduled for a late-1981 first delivery, and the Amdahl 580 Model 5860 is slated for August, 1982. The tide is gradually turning.

Becoming a *multiple-vendor shop* can be viewed as either an advantage or disadvantage of installing a PCM. Some users are still "true-blue" IBM loyalists, who fear that their IBM service will deteriorate and every hardware problem will result in a nasty "finger-pointing" session if they allow any non-IBM equipment into their shops. Conversely, other users are convinced that dealing with multiple vendors helps to "keep IBM honest" and leads to better overall service and support.

Three potential disadvantages are commonly cited by prospective PCM users: the possibility of hardware or software incompatibilities, the possibility of weak vendor support, and the possibility that their PCM vendor may not survive. Each of these problems can be minimized through careful selection of a well-qualified vendor.

Incompatibilities in hardware or software were widely feared by early PCM users, but Datapro's user surveys have clearly shown that users who choose to deal with well-established PCM suppliers such as Amdahl or Control

	Amdahl	IPL	Magnuson	NAS	IBM S/370	IBM 4300	IBM 303X	IBM 3081
Ease of operation	3.49	3.88	3.83	3.64	3.03	3.25	3.21	3.22
Reliability of Mainframe	3.62	4.00	3.34	3.64	3.12	3.78	3.59	3.67
Reliability of Peripherals	3.13	2.57	3.15	2.91	3.13	3.29	3.27	3.30
Responsiveness of maintenance service	3.47	3.88	3.45	3.45	3.15	3.32	3.44	3.46
Effectiveness of maintenance service	3.33	3.75	3.21	3.18	3.05	3.21	3.34	3.46
Technical support								
Trouble-shooting	3.18	3.63	3.11	2.82	2.77	2.81	3.00	3.31
Education	2.98	3.86	3.08	2.78	2.76	2.73	2.95	2.96
Documentation	2.83	2.88	3.04	2.89	2.66	2.66	2.88	3.12
Ease of programming	3.00	3.50	3.33	3.00	2.89	2.97	2.96	2.96
Ease of conversion	3.24	3.71	3.59	3.00	2.94	2.95	3.02	3.22
Overall satisfaction	3.37	3.75	3.37	3.45	3.05	3.15	3.18	3.33

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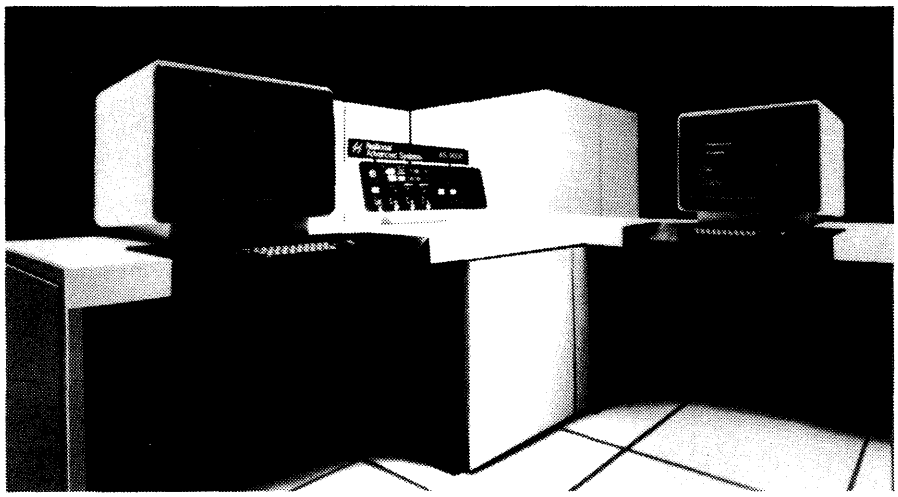

The NAS AS/9000 Series competes with IBM's 3033 and 3081 processors. Available in both single- and dual-processor models, the AS/9000 Series features from 4 to 32 megabytes of main memory and from 16 to 32 I/O channels. The service processor console includes two color display terminals, two independent processors, and two flexible disk drives.

Data need have no fears. What's more, most PCM manufacturers have demonstrated their ability to develop the specialized hardware and/or software needed to maintain full compatibility when IBM adds new functions to its systems. Conversely, users who decide to deal with a newer PCM vendor should demand proof (in the form of a rigorous benchmark test) and/or an iron-clad guarantee that the new mainframe will be totally compatible with their IBM equipment, systems software, and application programs.

Poor vendor support is another frequently expressed worry of prospective PCM users. Once again our user survey results make it clear that Amdahl, Control Data, Magnuson, and NAS have all established viable field service and support organizations whose effects are often judged to be superior to those of IBM. As always, it's up to the buyers to determine the amount of service and support they need and are willing to pay for, and then to select a PCM vendor that can and will provide it.

Vendor survival has always been a topic of concern to PCM buyers, and the PCMs' long-term survival will depend upon their continued ability to maintain full compatibility together with a worthwhile price/performance advantage over the steadily improving mainframes that IBM will undoubtedly offer.

The PCM Suppliers

Amdahl Corporation, which was formed in 1971 and delivered its first computer in June 1975, is the leading supplier (in terms of dollar volume) of IBM-compatible mainframes, with several hundred installations nationwide. The firm's software development efforts have resulted in significant improvements over comparable IBM products. Amdahl also offers its Universal Time-Sharing System (UTS), which is based on the Unix operating system developed by Bell Laboratories.

Amdahl focuses on the upper end of IBM's mainframe product line and has developed advanced technology that enables its computers to deliver more performance per dollar than the comparable IBM models. The current Amdahl 470 Series processor line ranges from the 470V/7 family which is comparable in performance to the IBM 3032 and 3033 uniprocessors, to the 470V/8, which is comparable to the dual-processor IBM 3033MP. Amdahl's largest systems, the 580 Series, are targeted at IBM's 3081, as well as future IBM offerings in that size range.

Cambex Corporation, formerly Cambridge Memories, Inc., is best known as a supplier of add-on memory for IBM System/360 and System/370 computers and for various minicomputers. Cambex entered the PCM market in 1977 with replacements for the System/370 Model 115 and 125, but the firm is now concentrating its attention on the IBM 4300 Series. The current product line consists of three models, the 1636, 1641, and 1651, that bracket the 4300 product line.

Control Data Corporation is the only established mainframe manufacturer that offers a line of IBM-compatible processors in addition to its own proprietary computer systems. CDC became the third major contender in the PCM market when it introduced its Omega family of System/370-compatible mainframes in June 1977. The present three models, the 480-I, 480-II, and 480-III, are made by IPL Systems. The 480-I and -II bracket the IBM 4331-2 in performance, and the larger 480-III exceeds both the IBM 3031 and 4341-2 in performance.

IPL Systems, Inc., a seven-year-old firm, was formed by Stephen J. Ippolito to build IBM 360/370-compatible processors. The first IPL systems were shipped in April 1977 as the Control Data Omega 480 Series. Today IPL systems are still sold by CDC and by Olivetti in Europe. With an installed base of over 170 systems, IPL decided to market its own products in the U.S. In October, 1980, IPL announced three systems to compete against the IBM 4300; the IPL 4436, 4443, and 4446. The systems all offer improved price/performance over their IBM counterparts, the 4331-2, 4341-1, and 4341-2, respectively. In November 1981, IPL announced the 4445, which competes against IBM's new 4341-11.

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Magnuson Systems Corporation has become a key PCM supplier with an excellent reputation, as indicated in our surveys. Users continually sing the praises of their M80 systems. Magnuson's "Strategic Architecture" permits easy field upgrading of the processor, memory, and I/O channels, as well as rapid adaptation to maintain compatibility with new IBM functions or features. The current product line consists of the M80/30, which competes with the IBM 4331-1; the M80/30E, which is a replacement for the IBM 4331-11; the M80/31 and M80/32, which are targeted at the IBM 4331-2 market; the M80/41, which competes with the IBM 4341-10; and the M80/42 and M80/43, which compete with the IBM 4341-1. Magnuson has discontinued the larger M80/44.

National Advanced Systems Corporation (NAS) is the wholly owned subsidiary of National Semiconductor Corporation that was formed in October, 1979 to take over nearly all of Itel Corporation's IBM-compatible mainframe business. NAS took over Itel's worldwide computer activities, acquired Itel's inventory of computers, and assumed the maintenance and support responsibilities for all of Itel's installed computer base, including those systems manufactured by Hitachi, Ltd.

The company's current product line, the AS/3000 Series, AS/5000 Series, AS/6100 Series, AS/7000 Series, and AS/9000 Series, range in performance from the IBM 4341-1 up through the 3081. The AS/6100 Series was announced in April 1982 and is intended to fill the performance gap between IBM's 4341-2 and the new 3083E. The AS/6100 Series will eventually replace the AS/3000 Series and AS/5000 Series, which are now in limited new production.

The Comparison Charts

The principal characteristics of 42 processors that are plug-compatible with IBM computers are presented in the accompanying comparison charts. The entries for each model are spread across two facing pages to maximize the amount of useful information in the charts. All information in the charts was furnished by the six vendors whose products are represented.

The entries on the left-hand pages of the comparison charts and their significance are explained in the following paragraphs:

Model refers to the product number as known in the equipment price book or list of the vendor or manufacturer.

Date of introduction indicates when the processor was first announced to the public in the U.S.

Production status indicates whether the processor is now in new production or being sold from returned and refurbished stocks.

Operating systems indicates the IBM monitoring software that will run on the processor. All operating systems that apply to a particular processor are specified.

Virtual storage capability defines the presence of a hardware/software feature enabling the user to access and utilize memory space without regard to its existence in real main memory or auxiliary memory space.

The *Clock comparator* is a hardware feature that causes an interruption when the time-of-day equals or exceeds the value specified by a program or virtual machine.

The *CPU timer* measures the elapsed processing unit time and causes an interruption when a previously specified amount of time has elapsed.

Control registers are used for operating systems control of relocation, priority interruption, program event recording, error recovery, and masking operations.

CPU one-level addressing is a synonym for direct addressing, where the instruction contains the actual address of the data being requested.

A *doubleword buffer* consists of a 64-bit area temporarily reserved for data used in performing an I/O operation.

The *interval timer* is a 32-bit decremental counter that is reduced by one several hundred times per second. The timer generates an interrupt when the contained value is decremented from a positive to a negative number.

Machine check handling analyzes errors and attempts recovery by retrying the failed instruction if possible. If retry is unsuccessful, it attempts to correct the malfunction or to isolate the affected task.

Multiple bus architecture implies that the various segments of the processor (namely, memory, arithmetic and logic, central control, etc.) are tied together by more than one central bus.

Storage protection determines the right of access to main storage by matching a protection key associated with a store or fetch reference to main storage with a storage key associated with each block of main storage.

The *time-of-day-clock* is incremented once every microsecond and provides a consistent measure of elapsed time suitable for the indication of data and time.

Some channels have the capability to perform *channel command retry,* a channel and control-unit procedure that causes a command to be retried without requiring an I/O interruption.

Channel indirect addressing (CIA) is a companion feature to dynamic address translation, providing data addresses for I/O operations. CIA permits a single channel command word to control the transmission of data that crosses noncontiguous pages in real main storage. If CIA is not indicated, then channel one-level (direct) addressing is employed.

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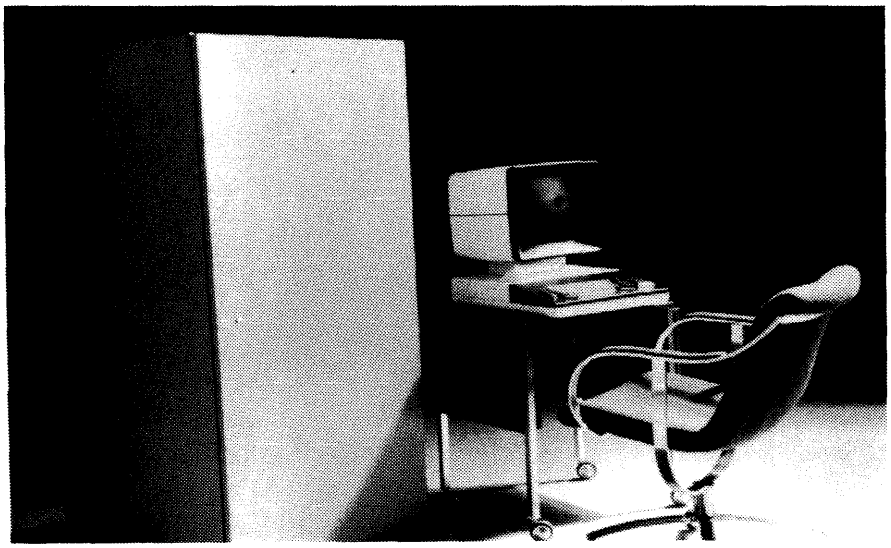

The Magnuson M80 Series now consists of seven models that are compatible with IBM's 4300 Series. The entry-level M80/30 shown here was introduced in August 1981. The basic system includes 512K bytes of memory expandable to 8192K bytes, a console, and 2 I/O channels.

The *byte oriented operand feature* permits storage operands of most non-privileged operations to appear on any byte boundary. Instructions must appear on even byte boundaries. The feature does not pertain to instruction addresses.

The *extended precision floating point* feature provides instructions to handle floating point numbers with a fraction of 28 hexadecimal digits. The characteristic is seven bits plus sign in short and extended floating point numbers.

The *high speed floating point feature* provides a means for improved execution of the floating point instruction set.

The *System/370 Universal Instruction set* is composed of storage protection, standard instruction set, decimal arithmetic, extended precision, dynamic address translation, and instructions to facilitate programming and reduce execution times for record blocking and unblocking.

The *console audible alarm* is a device activated when predetermined events occur that require operator attention or intervention for system operation.

The *integrated console printer* is an integral part of the system console, furnishing hard copy output from the console display.

A *light pen* is a photosensitive stylus used to detect and identify elements displayed on the console CRT.

A *remote console* is a console attached to a system through a data link. The remote console is configured in addition to the standard console.

The *remote data link* allows establishment of communications with a technical data center to remotely diagnose system malfunctions.

The *console file* is the basic microprogram loading device for the system, containing a read-only file device. The medium read by this device contains all the microcode for field engineering device diagnostics, basic system features, and any optional system features.

The *CPU activity monitor* can be either hardware or software. It provides a measure of CPU utilization by various hardware or software elements.

The *extended control mode* (EC) is a mode in which all features of the System/370 computing system, including dynamic address translation, are operational.

Program event recording is a hardware feature used to assist in debugging programs by detecting and recording program events.

The *virtual machine assist* feature provides an assist to VM/370 firmware emulation of certain privileged operations. The feature causes a reduction in real supervisor time used by VM/370 to control the operation of virtual storage operating system such as DOS/VS and OS/VS1.

1401/1440/1460 compatibility provides the system with the ability to execute 1401/1440/1460 instructions under specific conditions of minimum and matching configurations.

Under *other features and comments* any additional information that may help to give you a feel for the distinctive attributes of each unit is included.

The right-hand pages of the charts compare Processor Performance, I/O Channels, Control Storage, Pricing, and Availability, and identify the manufacturer and vendor of each processor. These entries should all be self-explanatory.

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MODEL	Amdahl 470V/5	Amdahl 470V/5-II	Amdahl 470V/6	Amdahl 470V/6-II
SYSTEM PARAMETERS				
Date of introduction	3/28/77	10/17/78	9/11/74	2/9/77
Date of first delivery	9/77	4/79	6/75	8/77
Number installed to date	Proprietary information	Proprietary information	Proprietary information	Proprietary information
Production status	Not in new production	Not in new production	Not in new production	Not in new production
Operating systems				
DOS/VS	Yes	Yes	Yes	Yes
DOS/VSE	Yes	Yes	Yes	Yes
OS/VS1	Yes	Yes	Yes	Yes
SVS	Yes	Yes	Yes	Yes
MVS	Yes	Yes	Yes	Yes
VM/370	Yes	Yes	Yes	Yes
VM/SP	Yes	Yes	Yes	Yes
Others	ACP, MFT, MVT	ACP, MFT, MVT	ACP, MFT, MVT	ACP, MFT, MVT
PROCESSING FEATURES				
Virtual storage capability	Standard	Standard	Standard	Standard
Processor arrangements				
Uniprocessor	Yes	Yes	Yes	Yes
Attached processor	—	—	—	—
Front end to	—	—	—	—
Back end to	—	—	—	—
Multiprocessor	—	—	—	—
Minimum in complex	—	—	—	—
Maximum in complex	—	—	—	—
Clock comparator	Standard	Standard	Standard	Standard
CPU timer	Standard	Standard	Standard	Standard
Control registers	Standard	Standard	Standard	Standard
CPU one-level addressing	Standard	Standard	Standard	Standard
Doubleword buffer	Standard	Standard	Standard	Standard
Interval timer	Standard	Standard	Standard	Standard
Machine check handling	Standard	Standard	Standard	Standard
Multiple bus architecture	Standard	Standard	Standard	Standard
Storage protection	Standard	Standard	Standard	Standard
Time-of-day-clock	Standard	Standard	Standard	Standard
Channel command retry	Standard	Standard	Standard	Standard
Channel indirect addressing	Standard	Standard	Standard	Standard
Byte oriented operand feature	Standard	Standard	Standard	Standard
Extended precision floating point	Standard	Standard	Standard	Standard
High speed floating point	Standard	Standard	Standard	Standard
System/370 Universal Instruction set	Standard	Standard	Standard	Standard
Console audible alarm	Standard	Standard	Standard	Standard
Integrated console printer	No	No	No	No
Light pen	No	No	No	No
Remote console	Standard	Standard	Standard	Standard
Remote data link	Standard	Standard	Standard	Standard
Console file	Standard	Standard	Standard	Standard
CPU activity monitor	Optional	Optional	Optional	Optional
Extended control mode	Standard	Standard	Standard	Standard
Program event recording	Standard	Standard	Standard	Standard
Virtual machine assist	VM/SA	VM/SA	VM/SA	VM/SA
1401/1440/1460 compatibility	No	No	No	No
OTHER FEATURES & COMMENTS	470 accelerator; two-byte channel interface optional on all models; all systems air cooled	See 470V/5 Comments	See 470V/5 Comments	See 470V/5 Comments

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Amdahl 470V/5	Amdahl 470V/5-II	Amdahl 470V/6	Amdahl 470V/6-II	MODEL
				PROCESSOR PERFORMANCE
32.5	32.5	32.5	32.5	Machine cycle time, nanoseconds
IBM 370 Mod. 168-3 or 3032 .9 to 1.1	IBM 370 Mod. 168-3 or 3032 1.0 to 1.2	IBM 370 Mod. 168-3 or 3032 1.3 to 1.5	IBM 370 Mod. 168-3 or 3032 1.4 to 1.6	Relative performance*
—	—	—	—	To
—	—	—	—	Performance of
470V/5-II	470V/6	470V/6-II	—	To Performance of Field Upgradable to
				MAIN STORAGE
Dynamic NMOS	Dynamic NMOS	Dynamic NMOS	Dynamic NMOS	Storage type
Yes	Yes	Yes	Yes	Checking
Yes	Yes	Yes	Yes	Parity
1	1	1	1	Error detection & correction
—	—	—	—	No. of check bits per byte
320	320	320	320	No. of check bits per word
320	320	320	320	Read cycle, nanoseconds
4	4	4	4	Write cycle, nanoseconds
4M	4M	4M	4M	Bytes fetched per cycle
16M	16M	16M	16M	Minimum capacity, bytes
4M	4M	4M	4M	Maximum capacity, bytes
Yes	Yes	Yes	Yes	Increment size, bytes
8	8	8	8	Interleaving
16	16	16	16	Minimum number of ways Maximum number of ways
Yes	Yes	Yes	Yes	BUFFER (CACHE) STORAGE
Bipolar RAM	Bipolar RAM	Bipolar RAM	Bipolar RAM	Storage type
65	65	65	65	Cycle time, nanoseconds
4	4	4	4	Bytes fetched per cycle
16K	32K	16K	32K	Minimum capacity, bytes
16K	32K	16K	32K	Maximum capacity, bytes
				I/O CHANNELS
8	8	8	8	Selector channels standard
16	16	8	16	Selector channels optional
8	8	8	8	Block multiplexers standard
16	16	16	16	Block multiplexers optional
8	8	8	8	Byte multiplexers standard
16	16	16	16	Byte multiplexers optional
				Subchannels per channel
256	256	256	256	On a block multiplexer
256	256	256	256	On a byte multiplexer
256	256	256	256	On a selector
Yes	Yes	Yes	Yes	Channel to channel adapter
				Maximum channel data rates
2M	2M	2M	2M	Block multiplexer, bytes/sec.
110K	110K	110K	110K	Byte multiplexer, bytes/sec.
2M	2M	2M	2M	Selector channel, bytes/sec.
13M	13M	13M	13M	Aggregate data rate, bytes/sec.
Yes	Yes	Yes	Yes	Data Streaming
N/A	N/A	N/A	N/A	CONTROL STORAGE
—	—	—	—	Storage type
—	—	—	—	Access time, nanoseconds
—	—	—	—	Word size, bits
—	—	—	—	Minimum number of words
—	—	—	—	Maximum number of words
—	—	—	—	Control storage usage
				PRICING & AVAILABILITY
Contact vendor	Contact vendor	Contact vendor	Contact vendor	Purchase of CPU with min. memory
Yes	Yes	Yes	Yes	Lease terms offered
Yes	Yes	Yes	Yes	Vendor's
—	—	—	—	Third party
Contact vendor	Contact vendor	Contact vendor	$45,500/mo. (4-yr)	Lease of CPU with min. memory (1-yr.)
4MB	4MB	4MB	4MB	Memory increment size
$150,000	$150,000	$150,000	$150,000	Memory increment purchase
Yes	Yes	Yes	Yes	Vendor offered maintenance
—	—	—	—	Prime time
—	—	—	—	Additional hours
$8,925/mo.	$9,030/mo.	$9,275/mo.	$9,380/mo.	24 hour
—	—	—	—	Other plans
Amdahl	Amdahl	Amdahl	Amdahl	Manufacturer
Amdahl	Amdahl	Amdahl	Amdahl	Vendor

*As rated by the PCM vendor.

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MODEL	Amdahl 470V/7	Amdahl 470V/7A	Amdahl 470V/7B	Amdahl 470V/7C
SYSTEM PARAMETERS				
Date of introduction	3/28/77	8/1/79	11/79	11/18/80
Date of first delivery	8/78	9/79	3/80	3rd Quarter 1981
Number installed to date	—	—	—	—
Production status	Active	Active	Active	Active
Operating systems				
DOS/VS	Yes	Yes	Yes	Yes
DOS/VSE	Yes	Yes	Yes	Yes
OS/VS1	Yes	Yes	Yes	Yes
SVS	Yes	Yes	Yes	Yes
MVS	Yes	Yes	Yes	Yes
VM/370	Yes	Yes	Yes	Yes
VM/SP	Yes	Yes	Yes	Yes
Others	MVS/XA, ACP, MFT, MVT	MVS/XA, ACP, MFT, MVT	MVS/XA, ACP, MFT, MVT	MVS/XA, ACP, MFT, MVT
PROCESSING FEATURES				
Virtual storage capability	Standard	Standard	Standard	Standard
Processor arrangements				
Uniprocessor	Yes	Yes	Yes	Yes
Attached processor	—	—	—	—
Front end to	—	—	—	—
Back end to	—	—	—	—
Multiprocessor	—	—	—	—
Minimum in complex	—	—	—	—
Maximum in complex	—	—	—	—
Clock comparator	Standard	Standard	Standard	Standard
CPU timer	Standard	Standard	Standard	Standard
Control registers	Standard	Standard	Standard	Standard
CPU one-level addressing	Standard	Standard	Standard	Standard
Doubleword buffer	Standard	Standard	Standard	Standard
Interval timer	Standard	Standard	Standard	Standard
Machine check handling	Standard	Standard	Standard	Standard
Multiple bus architecture	Standard	Standard	Standard	Standard
Storage protection	Standard	Standard	Standard	Standard
Time-of-day-clock	Standard	Standard	Standard	Standard
Channel command retry	Standard	Standard	Standard	Standard
Channel indirect addressing	Standard	Standard	Standard	Standard
Byte oriented operand feature	Standard	Standard	Standard	Standard
Extended precision floating point	Standard	Standard	Standard	Standard
High speed floating point	Standard	Standard	Standard	Standard
System/370 Universal Instruction set	Standard	Standard	Standard	Standard
Console audible alarm	Standard	Standard	Standard	Standard
Integrated console printer	No	No	No	No
Light pen	No	No	No	No
Remote console	Standard	Standard	Standard	Standard
Remote data link	Standard	Standard	Standard	Standard
Console file	Standard	Standard	Standard	Standard
CPU activity monitor	Optional	Optional	Optional	Optional
Extended control mode	Standard	Standard	Standard	Standard
Program event recording	Standard	Standard	Standard	Standard
Virtual machine assist	VM/SA	VM/SA	VM/SA	VM/SA
1401/1440/1460 compatibility	No	No	No	No
OTHER FEATURES & COMMENTS	Air cooled; two-byte channel interface optional	Air cooled; 470 accelerator; two-byte channel interface optional	Air cooled; 470 accelerator; 470 extended performance accelerator; two-byte channel interface optional	Air cooled; 470 accelerator; two-byte channel interface optional

All About Plug-Compatible Mainframes

Amdahl 470V/7	Amdahl 470V/7A	Amdahl 470V/7B	Amdahl 470V/7C	MODEL
				PROCESSOR PERFORMANCE
29	29	29	29	Machine cycle time, nanoseconds
IBM 3033U	IBM 3033N	IBM 3032	IBM 3033S	Relative performance*
1.1	1.1 to 1.2	1.4 to 1.6	1.0	To
—	—	—	—	Performance of
—	—	—	—	To
470V/8	470V/7	470V/7A	470V/7B	Performance of
				Field Upgradable to
				MAIN STORAGE
Dynamic NMOS	Dynamic NMOS	Dynamic NMOS	Dynamic NMOS	Storage type
Yes	Yes	Yes	Yes	Checking
Yes	Yes	Yes	Yes	Parity
1	1	1	1	Error detection & correction
—	—	—	—	No. of check bits per byte
320	320	320	320	No. of check bits per word
320	320	320	320	Read cycle, nanoseconds
4	4	4	4	Write cycle, nanoseconds
8M	8M	8M	8M	Bytes fetched per cycle
32M	32M	32M	16M	Minimum capacity, bytes
4M	4M	4M	4M	Maximum capacity, bytes
Yes	Yes	Yes	Yes	Increment size, bytes
8	8	8	8	Interleaving
16	16	16	16	Minimum number of ways
				Maximum number of ways
Yes	Yes	Yes	Yes	BUFFER (CACHE) STORAGE
Bipolar RAM	Bipolar RAM	Bipolar RAM	Bipolar RAM	Storage type
58	58	58	58	Cycle time, nanoseconds
4	4	4	4	Bytes fetched per cycle
32K	32K	32K	32K	Minimum capacity, bytes
32K	32K	32K	32K	Maximum capacity, bytes
				I/O CHANNELS
12	8	8	8	Selector channels standard
32	32	32	16	Selector channels optional
12	8	8	8	Block multiplexers standard
32	32	32	16	Block multiplexers optional
12	8	8	8	Byte multiplexers standard
32	32	32	16	Byte multiplexers optional
				Subchannels per channel
256	256	256	256	On a block multiplexer
256	256	256	256	On a byte multiplexer
256	256	256	256	On a selector
Yes	Yes	Yes	Yes	Channel to channel adapter
				Maximum channel data rates
2M	2M	2M	2M	Block multiplexer, bytes/sec.
110K	110K	110K	110K	Byte multiplexer, bytes/sec.
2M	2M	2M	2M	Selector channel, bytes/sec.
18M	18M	18M	18M	Aggregate data rate, bytes/sec.
Yes	Yes	Yes	Yes	Data Streaming
				CONTROL STORAGE
N/A	N/A	N/A	N/A	Storage type
—	—	—	—	Access time, nanoseconds
—	—	—	—	Word size, bits
—	—	—	—	Minimum number of words
—	—	—	—	Maximum number of words
—	—	—	—	Control storage usage
				PRICING & AVAILABILITY
$1,850,000	$1,375,000	$1,225,000	$1,150,000	Purchase of CPU with min. memory
Yes	Yes	Yes	Yes	Lease terms offered
Yes	Yes	Yes	Yes	Vendor's
—	—	—	—	Third party
$70,960/mo. (4-yr)	$60,245/mo. (4-yr)	$54,285/mo. (4-yr)	$52,150/mo. (4-yr)	Lease of CPU with min. memory (1-yr.)
4MB	4MB	4MB	4MB	Memory increment size
$150,000	$150,000	$150,000	$150,000	Memory increment purchase
Yes	Yes	Yes	Yes	Vendor offered maintenance
—	—	—	—	Prime time
—	—	—	—	Additional hours
$12,170/mo.	$11,400/mo.	$11,140/mo.	$9,550/mo.	24 hour
—	—	—	—	Other plans
Amdahl	Amdahl	Amdahl	Amdahl	Manufacturer
Amdahl	Amdahl	Amdahl	Amdahl	Vendor

*As rated by the PCM vendor.

All About Plug-Compatible Mainframes

MODEL	Amdahl 470V/8	Amdahl 5860	Amdahl 5870	Amdahl 5880
SYSTEM PARAMETERS				
Date of introduction	10/17/78	11/18/80	10/27/81	11/18/80
Date of first delivery	9/79	3rd Quarter 1982	3rd Quarter 1983	3rd Quarter 1983
Number installed to date	—	—	—	—
Production status	Active	Active	Active	Active
Operating systems				
DOS/VS	Yes	Yes	Yes	Yes
DOS/VSE	Yes	Yes	Yes	Yes
OS/VS1	Yes	Yes	Yes	Yes
SVS	Yes	Yes	Yes	Yes
MVS	Yes	Yes	Yes	Yes
VM/370	Yes	Yes	Yes	Yes
VM/SP	Yes	Yes	Yes	Yes
Others	MVS/XA, ACP, MFT, MVT	ACP, MVS/XA	MVS/XA	MVS/XA
PROCESSING FEATURES				
Virtual storage capability	Standard	Standard	Standard	Standard
Processor arrangements				
Uniprocessor	Yes	Yes	No	No
Attached processor	—	—	—	—
Front end to	—	—	—	—
Back end to	—	—	—	—
Multiprocessor	—	—	Yes	Yes
Minimum in complex	—	—	2	2
Maximum in complex	—	—	2	2
Clock comparator	Standard	Standard	Standard	Standard
CPU timer	Standard	Standard	Standard	Standard
Control registers	Standard	Standard	Standard	Standard
CPU one-level addressing	Standard	Standard	Standard	Standard
Doubleword buffer	Standard	Standard	Standard	Standard
Interval timer	Standard	Standard	Standard	Standard
Machine check handling	Standard	Standard	Standard	Standard
Multiple bus architecture	Standard	Standard	Standard	Standard
Storage protection	Standard	Standard	Standard	Standard
Time-of-day-clock	Standard	Standard	Standard	Standard
Channel command retry	Standard	Standard	Standard	Standard
Channel indirect addressing	Standard	Standard	Standard	Standard
Byte oriented operand feature	Standard	Standard	Standard	Standard
Extended precision floating point	Standard	Standard	Standard	Standard
High speed floating point	Standard	Standard	Standard	Standard
System/370 Universal Instruction set	Standard	Standard	Standard	Standard
Console audible alarm	Standard	Standard	Standard	Standard
Integrated console printer	No	No	No	No
Light pen	No	No	No	No
Remote console	Standard	Standard	Standard	Standard
Remote data link	Standard	Standard	Standard	Standard
Console file	Standard	Standard	Standard	Standard
CPU activity monitor	Optional	Standard	Standard	Standard
Extended control mode	Standard	Standard	Standard	Standard
Program event recording	Standard	Standard	Standard	Standard
Virtual machine assist	VM/SA	VM/SA	VM/SA	VM/SA
1401/1440/1460 compatibility	No	No	No	No
OTHER FEATURES & COMMENTS	Air-cooled; two-byte channel interface optional	Distributed microcode; Macrocode in all models	See 5860 Comments	See 5860 Comments

All About Plug-Compatible Mainframes

Amdahl 470V/8	Amdahl 5860	Amdahl 5870	Amdahl 5880	MODEL
				PROCESSOR PERFORMANCE
26	24	24	24	Machine cycle time, nanoseconds
IBM 3033U	IBM 3081D	IBM 3081D	IBM 3081D	Relative performance*
1.3	1.3	2.2	2.3	To
—	—	—	—	Performance of
—	—	—	—	To
—	5870, 5880	5880	—	Performance of
				Field Upgradable to
				MAIN STORAGE
Dynamic NMOS	Dynamic NMOS	Dynamic NMOS	Dynamic NMOS	Storage type
Yes	Yes	Yes	Yes	Checking
Yes	Yes	Yes	Yes	Parity
1	1	1	1.0	Error detection & correction
—	—	—	—	No. of check bits per byte
320	280	280	280	No. of check bits per word
320	280	280	280	Read cycle, nanoseconds
4	8	8	8	Write cycle, nanoseconds
8M	16M	16M	16M	Bytes fetched per cycle
32M	32M	32M	32M	Minimum capacity, bytes
4M	8M	8M	8M	Maximum capacity, bytes
Yes	Yes	Yes	Yes	Increment size, bytes
8	16	16	16	Interleaving
16	16	16	16	Minimum number of ways
				Maximum number of ways
Yes	Yes	Yes	Yes	BUFFER (CACHE) STORAGE
Bipolar RAM	Two Bipolar RAMs	Two Bipolar RAMs	Two Bipolar RAMs	Storage type
52	—	—	—	Cycle time, nanoseconds
4	8	8	8	Bytes fetched per cycle
64K	64K	64K	64K	Minimum capacity, bytes
64K	64K	64K	64K	Maximum capacity, bytes
				I/O CHANNELS
12	—	—	—	Selector channels standard
32	—	—	—	Selector channels optional
12	16	16	16	Block multiplexers standard
32	32	32	32	Block multiplexers optional
12	2	2	2	Byte multiplexers standard
32	0	0	0	Byte multiplexers optional
256	256	256	256	Subchannels per channel
256	256	256	256	On a block multiplexer
256	—	—	—	On a byte multiplexer
Yes	Yes	Yes	Yes	On a selector
				Channel to channel adapter
2M	6M	6M	6M	Maximum channel data rates
110K	200K	200K	200K	Block multiplexer, bytes/sec.
2M	—	—	—	Byte multiplexer, bytes/sec.
21M	80M	80M	80M	Selector channel, bytes/sec.
Yes	Yes	Yes	Yes	Aggregate data rate, bytes/sec.
				Data Streaming
				CONTROL STORAGE
N/A	4K RAM	4K RAM	4K RAM	Storage type
—	7.5	7.5	7.5	Access time, nanoseconds
—	Variable	Variable	Variable	Word size, bits
—	Variable	Variable	Variable	Minimum number of words
—	Variable	Variable	Variable	Maximum number of words
—	Variable	Variable	Variable	Control storage usage
				PRICING & AVAILABILITY
$2,075,000	$3,600,000	$5,400,000	$7,100,000 (32M memory)	Purchase of CPU with min. memory
Yes	Yes	Yes	Yes	Lease terms offered
Yes	Yes	Yes	Yes	Vendor's
—	—	—	—	Third party
$76,100/mo. (4-yr)	$90,350/mo. (4-yr)	$135,525/mo. (4-yr.)	$78,200/mo. (4-yr.)	Lease of CPU with min. memory (1-yr.)
4MB	8MB	8MB	8MB	Memory increment size
$150,000	$200,000	$200,000	$200,000	Memory increment purchase
Yes	Yes	Yes	Yes	Vendor offered maintenance
—	—	—	—	Prime time
—	—	—	—	Additional hours
$12,650/mo.	$11,300/mo.	$18,675/mo.	$20,815/mo.	24 hour
—	—	—	—	Other plans
Amdahl	Amdahl	Amdahl	Amdahl	Manufacturer
Amdahl	Amdahl	Amdahl	Amdahl	Vendor

*As rated by the PCM vendor.

All About Plug-Compatible Mainframes

MODEL	Cambex 1636	Cambex 1641	Cambex 1651	Control Data Omega 480-I
SYSTEM PARAMETERS				
Date of introduction	August 1980	August 1980	August 1980	6/77
Date of first delivery	4th Quarter 1980	4th Quarter 1980	3rd Quarter 1981	6/77
Number installed to date	—	—	—	Over 120
Production status	Active	Active	Active	Not in new production
Operating systems				
DOS/VS	Yes	Yes	Yes	Yes
DOS/VSE	Yes	Yes	Yes	Yes
OS/VS1	Yes	Yes	Yes	Yes
SVS	Yes	Yes	Yes	Yes
MVS	No	Yes	Yes	Yes
VM/370	Yes	Yes	Yes	Yes
VM/SP	Yes	Yes	Yes	No
Others	ACP	ACP	ACP	No
PROCESSING FEATURES				
Virtual storage capability	Standard	Standard	Standard	Standard
Processor arrangements				
Uniprocessor	Yes	Yes	Yes	Yes
Attached processor	—	—	—	—
Front end to	—	—	—	—
Back end to	—	—	—	—
Multiprocessor	—	—	—	—
Minimum in complex	—	—	—	—
Maximum in complex	—	—	—	—
Clock comparator	Standard	Standard	Standard	Standard
CPU timer	Standard	Standard	Standard	Standard
Control registers	Standard	Standard	Standard	Standard
CPU one-level addressing	Standard	Standard	Standard	No
Doubleword buffer	Standard	Standard	Standard	Standard
Interval timer	Standard	Standard	Standard	Standard
Machine check handling	Standard	Standard	Standard	Standard
Multiple bus architecture	No	No	No	No
Storage protection	Standard	Standard	Standard	Standard
Time-of-day-clock	Standard	Standard	Standard	Standard
Channel command retry	Standard	Standard	Standard	Standard
Channel indirect addressing	Standard	Standard	Standard	Standard
Byte oriented operand feature	Standard	Standard	Standard	Standard
Extended precision floating point	Standard	Standard	Standard	Standard
High speed floating point	Standard	Standard	Standard	Standard
System/370 Universal Instruction set	Standard	Standard	Standard	Standard
Console audible alarm	Standard	Standard	Standard	Standard
Integrated console printer	Optional	Optional	Optional	Optional
Light pen	No	No	No	No
Remote console	Optional	Optional	Optional	No
Remote data link	Optional	Optional	Optional	No
Console file	Standard	Standard	Standard	Standard
CPU activity monitor	No	No	No	No
Extended control mode	Standard	Standard	Standard	Standard
Program event recording	Standard	Standard	Standard	Standard
Virtual machine assist	Standard	Standard	Standard	Standard
1401/1440/1460 compatibility	No	No	No	No
OTHER FEATURES & COMMENTS	Formerly Cambridge Memories; 1636 upgraded from 1638	1641 upgraded from 1636	1651 available on field upgrade basis only	

All About Plug-Compatible Mainframes

Cambex 1636	Cambex 1641	Cambex 1651	Control Data Omega 480-I	MODEL
				PROCESSOR PERFORMANCE
50	50	50	50	Machine cycle time, nanoseconds
IBM 4331-2	IBM 4341-1	IBM 4341-2	IBM 4331-2	Relative performance*
1.1 to 1.3	0.9 to 1.1	0.9 to 1.1	0.9	To
—	—	—	—	Performance of
—	—	—	—	To
Cambex 1641	Cambex 1651	—	480-II	Performance of
				Field Upgradable to
Dynamic NMOS	Dynamic NMOS	Dynamic NMOS	Static NMOS	MAIN STORAGE
				Storage type
—	—	—	Yes	Checking
Yes	Yes	Yes	Yes	Parity
—	—	—	—	Error detection & correction
—	—	—	—	No. of check bits per byte
				No. of check bits per word
400	400	400	400	Read cycle, nanoseconds
400	400	400	400	Write cycle, nanoseconds
8	16	16	8	Bytes fetched per cycle
1M	2M	2M	0.5M	Minimum capacity, bytes
4M	16M	16M	2M	Maximum capacity, bytes
1M	1M	1M	0.5M	Increment size, bytes
No	No	No	No	Interleaving
—	—	—	—	Minimum number of ways
—	—	—	—	Maximum number of ways
No	Yes	Yes	No	BUFFER (CACHE) STORAGE
—	Bipolar RAM	Bipolar RAM	—	Storage type
—	100	100	—	Cycle time, nanoseconds
—	16	16	—	Bytes fetched per cycle
—	8K	8K	—	Minimum capacity, bytes
—	8K	8K	—	Maximum capacity, bytes
				I/O CHANNELS
—	—	—	—	Selector channels standard
—	—	—	—	Selector channels optional
2	2	4	2	Block multiplexers standard
2	2	1	2	Block multiplexers optional
1	1	1	1	Byte multiplexers standard
0	0	0	0	Byte multiplexers optional
				Subchannels per channel
256	256	256	256	On a block multiplexer
256	256	256	256	On a byte multiplexer
—	—	—	—	On a selector
Yes	Yes	Yes	—	Channel to channel adapter
				Maximum channel data rates
1.86M	1.86M	1.86M	1.85M	Block multiplexer, bytes/sec.
50K	50K	50K	50K	Byte multiplexer, bytes/sec.
—	—	—	—	Selector channel, bytes/sec.
11M	11M	11M	5M	Aggregate data rate, bytes/sec.
No	No	No	No	Data Streaming
				CONTROL STORAGE
Bipolar RAM	Bipolar RAM	Bipolar RAM	Bipolar R/W	Storage type
25	25	25	50	Access time, nanoseconds
36	36	36	8	Word size, bits
72K	72K	72K	54K	Minimum number of words
144K	144K	144K	144K	Maximum number of words
Instruc. microcode, operating system assist	Instruction microcode, operating system assist	Instruction microcode, operating system assist	—	Control storage usage
				PRICING & AVAILABILITY
$120,000	$170,000	Upgrade only, see below	$188,000	Purchase of CPU with min. memory
Yes; check vendor	Yes; check vendor	Yes; check vendor	Yes	Lease terms offered
Yes; check vendor	Yes; check vendor	Yes; check vendor	Yes	Vendor's
Check vendor	Check vendor	Check vendor	Yes	Third party
—	—	—	$6,267 (3-yr.)	Lease of CPU with min. memory (1-yr.)
1MB	1MB	1MB	0.5M	Memory increment size
$15,000	$15,000	$15,000	$22,500	Memory increment purchase
Yes	Yes	Yes	Yes	Vendor offered maintenance
$445/mo.	$750/mo.	$925/mo.	$1,320/mo.	Prime time
Yes	Yes	Yes	Yes	Additional hours
Yes	Yes	Yes	Yes	24 hour
Third party available	Third party available	Third party available	Weekend, holiday	Other plans
Cambex	Cambex	Cambex	IPL Systems	Manufacturer
Cambex	Cambex	Cambex	Control Data	Vendor
Note: Upgrade costs for 1636 to 1641; $58,000		Note: Upgrade costs for 1641 to 1651; $78,000		

*As rated by the PCM vendor.

All About Plug-Compatible Mainframes

MODEL	Control Data Omega 480-II	Control Data Omega 480-III	IPL 4436	IPL 4443
SYSTEM PARAMETERS				
Date of introduction	6/77	1979	10/80	10/80
Date of first delivery	1978	1979	4th Quarter 1980	2nd Quarter 1980*
Number installed to date	Over 120	Over 120	Proprietary information	Proprietary information
Production status	Active	Active	Active	Active
Operating systems				
DOS/VS	Yes	Yes	Yes	Yes
DOS/VSE	Yes	Yes	Yes	Yes
OS/VS1	Yes	Yes	Yes	Yes
SVS	Yes	Yes	Yes	Yes
MVS	Yes	Yes	Yes	Yes
VM/370	Yes	Yes	Yes	Yes
VM/SP	No	No	Yes	Yes
Others	No	No	MVS/SP	MVS/SP
PROCESSING FEATURES				
Virtual storage capability	Standard	Standard	Standard	Standard
Processor arrangements				
Uniprocessor	Yes	Yes	Yes	Yes
Attached processor	—	—	—	—
Front end to	—	—	—	—
Back end to	—	—	—	—
Multiprocessor	—	—	—	—
Minimum in complex	—	—	—	—
Maximum in complex	—	—	—	—
Clock comparator	Standard	Standard	Standard	Standard
CPU timer	Standard	Standard	Standard	Standard
Control registers	Standard	Standard	Standard	Standard
CPU one-level addressing	No	Standard	Standard	Standard
Doubleword buffer	Standard	Standard	Standard	Standard
Interval timer	Standard	Standard	Standard	Standard
Machine check handling	Standard	Standard	Standard	Standard
Multiple bus architecture	No	No	Standard	Standard
Storage protection	Standard	Standard	Standard	Standard
Time-of-day-clock	Standard	Standard	Standard	Standard
Channel command retry	Standard	Standard	Standard	Standard
Channel indirect addressing	Standard	Standard	Standard	Standard
Byte oriented operand feature	Standard	Standard	Standard	Standard
Extended precision floating point	Standard	Standard	Standard	Standard
High speed floating point	Standard	Standard	No	No
System/370 Universal Instruction set	Standard	Standard	Standard	Standard
Console audible alarm	Standard	Standard	Standard	Standard
Integrated console printer	No	Optional	Optional	Optional
Light pen	No	No	No	No
Remote console	No	No	No	No
Remote data link	No	No	Standard	Standard
Console file	Standard	Standard	Standard	Standard
CPU activity monitor	No	No	No	No
Extended control mode	Standard	Standard	Standard	Standard
Program event recording	Standard	Standard	Standard	Standard
Virtual machine assist	Standard	Standard	Standard	Standard
1401/1440/1460 compatibility	No	No	No	No
OTHER FEATURES & COMMENTS			Over 170 systems installed worldwide by IPL licensees Control Data (Omega Series) and Olivetti. All systems support the IBM 4300 ECPS mode	System introduced as Control Data Omega 480-3 in March 1979. *First end user system installed May, 1980

All About Plug-Compatible Mainframes

Control Data Omega 480-II	Control Data Omega 480-III	IPL 4436	IPL 4443	MODEL
				PROCESSOR PERFORMANCE
50	50	50	50	Machine cycle time, nanoseconds
				Relative performance*
IBM 4331-2	IBM 4341-2	IBM 4331-2	IBM 4341-1	To
1.25	1.22	1.5	1.0	Performance of
—	—	IBM 4341-10	—	To
—	—	1.0	—	Performance of
480-III	—	IPL 4443	IPL 4445	Field Upgradable to
				MAIN STORAGE
Static NMOS	Dynamic NMOS	Dynamic NMOS	Dynamic NMOS	Storage type
Yes	Yes	Yes	Yes	Checking
Yes	Yes	Yes	Yes	Parity
—	—	1	1	Error detection & correction
—	—	4	4	No. of check bits per byte
400	400	500	500	No. of check bits per word
400	400	500	500	Read cycle, nanoseconds
16	16	8	8	Write cycle, nanoseconds
1M	2M	1M	2M	Bytes fetched per cycle
4M	8M	8M	8M	Minimum capacity, bytes
1M	2M	1M or 2M	2M	Maximum capacity, bytes
No	No	No	No	Increment size, bytes
—	—	—	—	Interleaving
—	—	—	—	Minimum number of ways
				Maximum number of ways
Yes	Yes	No	Yes	BUFFER (CACHE) STORAGE
ECL	ECL	—	ECL	Storage type
100	100	—	100	Cycle time, nanoseconds
4	4	—	4	Bytes fetched per cycle
8K	8K	—	8K	Minimum capacity, bytes
8K	8K	—	8K	Maximum capacity, bytes
				I/O CHANNELS
—	—	—	—	Selector channels standard
—	—	—	—	Selector channels optional
4	4	2	2	Block multiplexers standard
1	1	3	3	Block multiplexers optional
1	1	1	1	Byte multiplexers standard
0	0	0	0	Byte multiplexers optional
				Subchannels per channel
256	256	256	256	On a block multiplexer
256	256	256	256	On a byte multiplexer
—	—	—	—	On a selector
—	—	No	No	Channel to channel adapter
				Maximum channel data rates
1.85M	1.85M	2M	2M	Block multiplexer, bytes/sec.
50K	50K	180K	180K	Byte multiplexer, bytes/sec.
—	—	—	—	Selector channel, bytes/sec.
5M	5M	11M	11M	Aggregate data rate, bytes/sec.
No	No	Yes	Yes	Data Streaming
				CONTROL STORAGE
Bipolar R/W	Bipolar R/W	ECL	ECL	Storage type
50	50	20	20	Access time, nanoseconds
8	8	36	36	Word size, bits
72K	72K	16K	16K	Minimum number of words
144K	144K	32K	32K	Maximum number of words
—	—	Instruction microcode, operating system assist	Instruction microcode, operating system assist	Control storage usage
				PRICING & AVAILABILITY
$279,000	$375,000	$140,000	$182,765	Purchase of CPU with min. memory
Yes	Yes	Yes	Yes	Lease terms offered
Yes	Yes	Yes	Yes	Vendor's
Yes	Yes	Yes	Yes	Third party
$9,300 (3-yr.)	$12,000 (3-yr.)	$4,885 (3-yr.)	$6,695 (3-yr.)	Lease of CPU with min. memory (1-yr.)
1MB	2MB	1MB or 2MB	2MB	Memory increment size
$45,000	$90,000	$15,700 or $31,400	$31,400	Memory increment purchase
Yes	Yes	Yes	Yes	Vendor offered maintenance
$1,915/mo.	$2,315/mo.	$485/mo.	$605/mo.	Prime time
Yes	Yes	Yes	Yes	Additional hours
Yes	Yes	Yes	Yes	24 hour
Weekend, holiday	Weekend, holiday	—	—	Other plans
IPL Systems	IPL Systems	IPL	IPL	Manufacturer
Control Data	Control Data	IPL	IPL	Vendor

*As rated by the PCM vendor.

All About Plug-Compatible Mainframes

MODEL	IPL 4445	IPL 4446	Magnuson M80 Model 30	Magnuson M80 Model 30E
SYSTEM PARAMETERS				
Date of introduction	11/81	10/80	8/81	11/81
Date of first delivery	3rd Quarter 1982	3rd Quarter 1981	9/81	12/81
Number installed to date	—	Proprietary information	—	—
Production status	Active	Active	Active	Active
Operating systems				
DOS/VS	Yes	Yes	Yes	Yes
DOS/VSE	Yes	Yes	Yes	Yes
OS/VS1	Yes	Yes	Yes	Yes
SVS	Yes	Yes	Yes	Yes
MVS	Yes	Yes	Yes	Yes
VM/370	Yes	Yes	Yes	Yes
VM/SP	Yes	Yes	Yes	Yes
Others	MVS/SP	MVS/SP	—	—
PROCESSING FEATURES				
Virtual storage capability	Standard	Standard	Standard	Standard
Processor arrangements				
Uniprocessor	Yes	Yes	Yes	Yes
Attached processor	—	—	—	—
Front end to	—	—	—	—
Back end to	—	—	—	—
Multiprocessor	—	—	—	—
Minimum in complex	—	—	—	—
Maximum in complex	—	—	—	—
Clock comparator	Standard	Standard	Standard	Standard
CPU timer	Standard	Standard	Standard	Standard
Control registers	Standard	Standard	Standard	Standard
CPU one-level addressing	Standard	Standard	Standard	Standard
Doubleword buffer	Standard	Standard	Standard	Standard
Interval timer	Standard	Standard	Standard	Standard
Machine check handling	Standard	Standard	Standard	Standard
Multiple bus architecture	Standard	Standard	Standard	Standard
Storage protection	Standard	Standard	Standard	Standard
Time-of-day-clock	Standard	Standard	Standard	Standard
Channel command retry	Standard	Standard	Standard	Standard
Channel indirect addressing	Standard	Standard	Standard	Standard
Byte oriented operand feature	Standard	Standard	Standard	Standard
Extended precision floating point	Standard	Standard	Standard	Standard
High speed floating point	No	No	No	Standard
System/370 Universal Instruction set	Standard	Standard	Standard	Standard
Console audible alarm	Standard	Standard	Standard	Standard
Integrated console printer	Optional	Optional	Optional	Optional
Light pen	No	No	No	No
Remote console	No	No	Optional	Optional
Remote data link	Standard	Standard	Optional	Optional
Console file	Standard	Standard	Standard	Standard
CPU activity monitor	No	No	Standard	Standard
Extended control mode	Standard	Standard	Standard	Standard
Program event recording	Standard	Standard	Standard	Standard
Virtual machine assist	Standard	Standard	Standard	Standard
1401/1440/1460 compatibility	No	No	No	No
OTHER FEATURES & COMMENTS			All M80 systems have Cullinane IDMS data base manager available as option; also supported are OS/MFT, OS/MVT, and DOS Release 26	

All About Plug-Compatible Mainframes

IPL 4445	IPL 4446	Magnuson M80 Model 30	Magnuson M80 Model 30E	MODEL
				PROCESSOR PERFORMANCE
50	50	100	100	Machine cycle time, nanoseconds
				Relative performance*
IBM 4341-11	IBM 4341-2	IBM 4331-1	IBM 4331-11	To
1.11	1.07	1.5	1.1	Performance of
—	—	—	—	To
—	—	—	—	Performance of
IPL 4446	—	M80/31	M80/31	Field Upgradable to
				MAIN STORAGE
Dynamic NMOS	Dynamic NMOS	Dynamic NMOS	Dynamic NMOS	Storage type
				Checking
Yes	Yes	Yes	Yes	Parity
Yes	Yes	Yes	Yes	Error detection & correction
1	1	1	1	No. of check bits per byte
4	4	4	4	No. of check bits per word
500	500	600	600	Read cycle, nanoseconds
500	500	500	500	Write cycle, nanoseconds
8	8	8	8	Bytes fetched per cycle
2M	2M	0.5M	1M	Minimum capacity, bytes
8M	16M	16M	16M	Maximum capacity, bytes
2M	2M	0.5M	1M	Increment size, bytes
No	No	No	No	Interleaving
—	—	—	—	Minimum number of ways
—	—	—	—	Maximum number of ways
				BUFFER (CACHE) STORAGE
Yes	Yes	No	No	Storage type
ECL	ECL	—	—	Cycle time, nanoseconds
100	100	—	—	Bytes fetched per cycle
4	4	—	—	Minimum capacity, bytes
8K	16K	—	—	Maximum capacity, bytes
8K	16K			
				I/O CHANNELS
—	—	0	0	Selector channels standard
—	—	15	15	Selector channels optional
2	2	1	2	Block multiplexers standard
3	3	14	13	Block multiplexers optional
1	1	1	1	Byte multiplexers standard
0	0	15	15	Byte multiplexers optional
				Subchannels per channel
256	256	256	256	On a block multiplexer
256	256	256	256	On a byte multiplexer
—	—	256	256	On a selector
No	No	Optional	Optional	Channel to channel adapter
				Maximum channel data rates
2M	2M	3M	3M	Block multiplexer, bytes/sec.
180K	180K	500K	500K	Byte multiplexer, bytes/sec.
—	—	3M	3M	Selector channel, bytes/sec.
11M	11M	10M	10M	Aggregate data rate, bytes/sec.
Yes	Yes	Yes	Yes	Data Streaming
				CONTROL STORAGE
ECL	ECL	Static NMOS	Static NMOS	Storage type
20	20	45	45	Access time, nanoseconds
36	36	32	32	Word size, bits
16K	16K	4K	4K	Minimum number of words
32K	32K	16K	16K	Maximum number of words
Instruction microcode, operating system assist	Instruction microcode, operating system assist	Instruction microcode, operating system assist	Instruction microcode, operating system assist	Control storage usage
				PRICING & AVAILABILITY
$228,335	$289,965	$86,000	$104,000	Purchase of CPU with min. memory
Yes	Yes	Yes	Yes	Lease terms offered
Yes	Yes	—	—	Vendor's
Yes	Yes	Yes	Yes	Third party
$7,795 (3-yr.)	$9,855 (3-yr.)	$3,753	$4,404	Lease of CPU with min. memory (1-yr.)
2MB	2MB	0.5MB	0.5MB	Memory increment size
$31,400	$31,400	$7,850	$15,700	Memory increment purchase
Yes	Yes	Yes	Yes	Vendor offered maintenance
$780/mo.	$880/mo.	Yes	Yes	Prime time
Yes	Yes	Yes	Yes	Additional hours
Yes	Yes	Yes	Yes	24 hour
—	—	—	—	Other plans
IPL	IPL	Magnuson	Magnuson	Manufacturer
IPL	IPL	Magnuson	Magnuson	Vendor

*As rated by the PCM vendor.

All About Plug-Compatible Mainframes

MODEL	Magnuson M80 Model 31	Magnuson M80 Model 32	Magnuson M80 Model 41	Magnuson M80 Model 42
SYSTEM PARAMETERS				
Date of introduction	6/80	3/79	11/81	3/79
Date of first delivery	6/80	5/80	2/82	9/81
Number installed to date	—	—	—	—
Production status	Active	Active	Active	Active
Operating systems				
DOS/VS	Yes	Yes	Yes	Yes
DOS/VSE	Yes	Yes	Yes	Yes
OS/VS1	Yes	Yes	Yes	Yes
SVS	Yes	Yes	Yes	Yes
MVS	Yes	Yes	Yes	Yes
VM/370	Yes	Yes	Yes	Yes
VM/SP	Yes	Yes	Yes	Yes
Others	MVS/SP	MVS/SP	MVS/SP	MVS/SP
PROCESSING FEATURES				
Virtual storage capability	Standard	Standard	Standard	Standard
Processor arrangements				
Uniprocessor	Yes	Yes	Yes	Yes
Attached processor	—	—	—	—
Front end to	—	—	—	—
Back end to	—	—	—	—
Multiprocessor	—	—	—	—
Minimum in complex	—	—	—	—
Maximum in complex	—	—	—	—
Clock comparator	Standard	Standard	Standard	Standard
CPU timer	Standard	Standard	Standard	Standard
Control registers	Standard	Standard	Standard	Standard
CPU one-level addressing	Standard	Standard	Standard	Standard
Doubleword buffer	Standard	Standard	Standard	Standard
Interval timer	Standard	Standard	Standard	Standard
Machine check handling	Standard	Standard	Standard	Standard
Multiple bus architecture	Standard	Standard	Standard	Standard
Storage protection	Standard	Standard	Standard	Standard
Time-of-day-clock	Standard	Standard	Standard	Standard
Channel command retry	Standard	Standard	Standard	Standard
Channel indirect addressing	Standard	Standard	Standard	Standard
Byte oriented operand feature	Standard	Standard	Standard	Standard
Extended precision floating point	Standard	Standard	Standard	Standard
High speed floating point	No	No	Standard	No
System/370 Universal Instruction set	Standard	Standard	Standard	Standard
Console audible alarm	Standard	Standard	Standard	Standard
Integrated console printer	Optional	Optional	Optional	Optional
Light pen	No	No	No	No
Remote console	Optional	Optional	Optional	Optional
Remote data link	Optional	Optional	Optional	Optional
Console file	Standard	Standard	Standard	Standard
CPU activity monitor	Standard	Standard	Standard	Standard
Extended control mode	Standard	Standard	Standard	Standard
Program event recording	Standard	Standard	Standard	Standard
Virtual machine assist	Standard	Standard	Standard	Standard
1401/1440/1460 compatibility	No	No	No	No
OTHER FEATURES & COMMENTS	All M80 systems have Cullinane IDMS data base manager available as option; also supported are OS/MFT, OS/MVT, DOS Release 26			

All About Plug-Compatible Mainframes

Magnuson M80 Model 31	Magnuson M80 Model 32	Magnuson M80 Model 41	Magnuson M80 Model 42	MODEL
				PROCESSOR PERFORMANCE
100	100	50	50	Machine cycle time, nanoseconds
IBM 4331-2	IBM 4331-2	IBM 4341-10	IBM 4341-1	Relative performance*
1.2	1.5	1.1	1.1	To
—	—	—	—	Performance of
—	—	—	—	To
M80/32	M80/41	M80/42	M80/43	Performance of
				Field Upgradable to
				MAIN STORAGE
Dynamic NMOS	Dynamic NMOS	Dynamic NMOS	Dynamic NMOS	Storage type
Yes	Yes	Yes	Yes	Checking
Yes	Yes	Yes	Yes	Parity
1	1	1	1	Error detection & correction
4	4	4	4	No. of check bits per byte
600	600	2000	2000	No. of check bits per word
500	500	1900	1900	Read cycle, nanoseconds
8	8	64	64	Write cycle, nanoseconds
1M	1M	2M	2M	Bytes fetched per cycle
16M	16M	16M	16M	Minimum capacity, bytes
1M	1M	1M	1M	Maximum capacity, bytes
No	No	No	No	Increment size, bytes
—	—	—	—	Interleaving
—	—	—	—	Minimum number of ways
				Maximum number of ways
No	Yes	Yes	Yes	BUFFER (CACHE) STORAGE
—	Static TTL	Static ECL	Static ECL	Storage type
—	300	50	50	Cycle time, nanoseconds
—	8	4	4	Bytes fetched per cycle
—	16K	24K	32K	Minimum capacity, bytes
—	16K	24K	32K	Maximum capacity, bytes
				I/O CHANNELS
0	0	0	0	Selector channels standard
15	15	15	15	Selector channels optional
2	2	2	2	Block multiplexers standard
13	13	13	13	Block multiplexers optional
1	1	1	1	Byte multiplexers standard
15	15	15	15	Byte multiplexers optional
256	256	256	256	Subchannels per channel
256	256	256	256	On a block multiplexer
256	256	256	256	On a byte multiplexer
Optional	Optional	Optional	Optional	On a selector
				Channel to channel adapter
3M	3M	3M	3M	Maximum channel data rates
500K	500K	500K	500K	Block multiplexer, bytes/sec.
3M	3M	3M	3M	Byte multiplexer, bytes/sec.
10M	10M	10M	10M	Selector channel, bytes/sec.
Yes	Yes	Yes	Yes	Aggregate data rate, bytes/sec.
				Data Streaming
				CONTROL STORAGE
Static NMOS	Static NMOS	Static ECL	Static ECL	Storage type
45	45	35	35	Access time, nanoseconds
32	32	80	80	Word size, bits
4K	4K	8K	8K	Minimum number of words
16K	16K	16K	16K	Maximum number of words
Instruction microcode, operating system assist	Instruction microcode, operating system assist	Instruction microcode, operating system assist	Instruction microcode, operating system assist	Control storage usage
				PRICING & AVAILABILITY
$116,000	$146,000	$163,000	183,000	Purchase of CPU with min. memory
Yes	Yes	Yes	Yes	Lease terms offered
—	—	—	—	Vendor's
Yes	Yes	Yes	Yes	Third party
$5,601/mo.	$6,936/mo.	$8,108/mo.	$8,727	Lease of CPU with min. memory (1-yr.)
1MB	1MB	1MB	1MB	Memory increment size
$15,700	$15,700	$15,700	$15,700	Memory increment purchase
Yes	Yes	Yes	Yes	Vendor offered maintenance
Yes	Yes	Yes	Yes	Prime time
Yes	Yes	Yes	Yes	Additional hours
Yes	Yes	Yes	Yes	24 hour
—	—	—	—	Other plans
Magnuson	Magnuson	Magnuson	Magnuson	Manufacturer
Magnuson	Magnuson	Magnuson	Magnuson	Vendor

*As rated by the PCM vendor.

All About Plug-Compatible Mainframes

MODEL	Magnuson M80 Model 43	NAS AS/3000N	NAS AS/3000	NAS AS/5000N
SYSTEM PARAMETERS				
Date of introduction	3/79	Jan. 1980	Jan. 1980	Sept. 1980
Date of first delivery	9/81	Jan. 1980	Jan. 1980	Sept. 1980
Number installed to date	—	Proprietary	Proprietary	—
Production status	Active	Limited new production	Limited new production	Limited new production
Operating systems				
DOS/VS	Yes	Yes	Yes	Yes
DOS/VSE	Yes	Yes	Yes	Yes
OS/VS1	Yes	Yes	Yes	Yes
SVS	Yes	Yes	Yes	Yes
MVS	Yes	Yes	Yes	Yes
VM/370	Yes	Yes	Yes	Yes
VM/SP	Yes	Yes	Yes	Yes
Others	MVS/SP	No	No	—
PROCESSING FEATURES				
Virtual storage capability	Standard	Standard	Standard	Standard
Processor arrangements				
Uniprocessor	Yes	Yes	Yes	Yes
Attached processor	—	—	—	—
Front end to	—	—	—	—
Back end to	—	—	—	—
Multiprocessor	—	—	—	—
Minimum in complex	—	—	—	—
Maximum in complex	—	—	—	—
Clock comparator	Standard	Standard	Standard	Standard
CPU timer	Standard	Standard	Standard	Standard
Control registers	Standard	Standard	Standard	Standard
CPU one-level addressing	Standard	Standard	Standard	Standard
Doubleword buffer	Standard	Standard	Standard	Standard
Interval timer	Standard	Standard	Standard	Standard
Machine check handling	Standard	Standard	Standard	Standard
Multiple bus architecture	Standard	Standard	Standard	Standard
Storage protection	Standard	Standard	Standard	Standard
Time-of-day-clock	Standard	Standard	Standard	Standard
Channel command retry	Standard	Standard	Standard	Standard
Channel indirect addressing	Standard	Standard	Standard	Standard
Byte oriented operand feature	Standard	Standard	Standard	Standard
Extended precision floating point	Standard	Standard	Standard	Standard
High speed floating point	Optional	No	No	No
System/370 Universal Instruction set	Standard	Standard	Standard	Standard
Console audible alarm	Standard	Standard	Standard	Standard
Integrated console printer	Optional	Optional	Optional	Optional
Light pen	No	No	No	Standard
Remote console	Optional	No	No	Optional
Remote data link	Optional	No	No	No
Console file	Standard	Standard	Standard	Standard
CPU activity monitor	Standard	Standard	Standard	Standard
Extended control mode	Standard	Standard	Standard	Standard
Program event recording	Standard	Standard	Standard	Standard
Virtual machine assist	Standard	Standard	Standard	Standard
1401/1440/1460 compatibility	No	Standard	Standard	Standard
OTHER FEATURES & COMMENTS				

All About Plug-Compatible Mainframes

Magnuson M80 Model 43	NAS AS/3000N	NAS AS/3000	NAS AS/5000N	MODEL
				PROCESSOR PERFORMANCE
50	115	115	92	Machine cycle time, nanoseconds
IBM 4341-1	IBM 4341-1	IBM 370/158-3	IBM 4341-1	Relative performance*
1.3	1.0	1.0	1.2	To
—	—	—	—	Performance of
—	—	—	—	To
—	AS/3000	—	AS/5000E, AS/5000	Performance of
				Field Upgradable to
				MAIN STORAGE
Dynamic NMOS	NMOS	NMOS	NMOS	Storage type
Yes	Yes	Yes	Yes	Checking
Yes	Yes	Yes	Yes	Parity
1	1	1	1	Error detection & correction
4	—	—	—	No. of check bits per byte
2000	920	920	460	No. of check bits per word
1900	690	690	460	Read cycle, nanoseconds
64	8	8	8	Write cycle, nanoseconds
2M	2M	2M	2M	Bytes fetched per cycle
16M	4M	8M	8M	Minimum capacity, bytes
1M	1M	1M	2M	Maximum capacity, bytes
No	No	No	No	Increment size, bytes
—	—	—	—	Interleaving
—	—	—	—	Minimum number of ways
				Maximum number of ways
Yes				
Static ECL	Bipolar ECL	Bipolar ECL	Bipolar ECL	BUFFER (CACHE) STORAGE
50	230	230	184	Storage type
4	8	8	8	Cycle time, nanoseconds
48K	8K	16K	8K	Bytes fetched per cycle
48K	8K	16K	8K	Minimum capacity, bytes
				Maximum capacity, bytes
				I/O CHANNELS
0	—	—	—	Selector channels standard
15	—	—	—	Selector channels optional
2	4	4	4	Block multiplexers standard
13	—	—	1	Block multiplexers optional
1	1	1	1	Byte multiplexers standard
15	—	—	1	Byte multiplexers optional
				Subchannels per channel
256	256	256	256	On a block multiplexer
256	256	256	256	On a byte multiplexer
256	—	—	—	On a selector
Optional	No	No	Optional	Channel to channel adapter
				Maximum channel data rates
3M	1.5M	1.5M	1.86M	Block multiplexer, bytes/sec.
500K	100K	100K	100K	Byte multiplexer, bytes/sec.
3M	—	—	—	Selector channel, bytes/sec.
10M	5.5M	5.5M	6.75M	Aggregate data rate, bytes/sec.
Yes	No	No	No	Data Streaming
				CONTROL STORAGE
Static ECL	Bipolar ECL	Bipolar ECL	Bipolar ECL	Storage type
35	10 to 20	10 to 20	10 to 20	Access time, nanoseconds
80	72	72	72	Word size, bits
8K	8K	8K	16K	Minimum number of words
16K	8K	8K	16K	Maximum number of words
Instruction microcode operating system assist	Instruction microcode, operating system assist	Instruction microcode, operating system assist	Instruction microcode, operating system assist	Control storage usage
				PRICING & AVAILABILITY
$228,000	$220,000	$225,000	$250,000	Purchase of CPU with min. memory
Yes	Yes	Yes	Yes	Lease terms offered
—	Yes	Yes	Yes	Vendor's
Yes	—	—	—	Third party
$10,004	Contact vendor	Contact vendor	Contact vendor	Lease of CPU with min. memory (1-yr.)
1MB	1MB	1MB	2MB	Memory increment size
$15,700	$12,500	$12,500	$50,000	Memory increment purchase
Yes	Yes	Yes	Yes	Vendor offered maintenance
Yes	Yes	Yes	Yes	Prime time
Yes	—	—	—	Additional hours
Yes	$937/mo.	$937/mo.	$2,646/mo.	24 hour
—	—	—	—	Other plans
Magnuson	NAS	NAS	NAS	Manufacturer
Magnuson	NAS	NAS	NAS	Vendor

*As rated by the PCM vendor.

All About Plug-Compatible Mainframes

MODEL	NAS AS/5000E	NAS AS/5000	NAS AS/6130	NAS AS/6150
SYSTEM PARAMETERS				
Date of introduction	Sept. 1980	Jan. 1980	April 1982	April 1982
Date of first delivery	Sept. 1980	Jan. 1980	4th Quarter 1982	1st Quarter 1983
Number installed to date	—	—	—	—
Production status	Limited new production	Limited new production	Active	Active
Operating systems				
DOS/VS	Yes	Yes	No	No
DOS/VSE	Yes	Yes	Yes	Yes
OS/VS1	Yes	Yes	Yes	Yes
SVS	Yes	Yes	No	No
MVS	Yes	Yes	Yes	Yes
VM/370	Yes	Yes	Yes	Yes
VM/SP	Yes	Yes	Yes	Yes
Others	No	MVS/SP	No	No
PROCESSING FEATURES				
Virtual storage capability	Standard	Standard	Standard	Standard
Processor arrangements				
Uniprocessor	Yes	Yes	Yes	Yes
Attached processor	—	—	—	—
Front end to	—	—	—	—
Back end to	—	—	—	—
Multiprocessor	—	—	—	—
Minimum in complex	—	—	—	—
Maximum in complex	—	—	—	—
Clock comparator	Standard	Standard	Standard	Standard
CPU timer	Standard	Standard	Standard	Standard
Control registers	Standard	Standard	Standard	Standard
CPU one-level addressing	Standard	Standard	Standard	Standard
Doubleword buffer	Standard	Standard	Standard	Standard
Interval timer	Standard	Standard	Standard	Standard
Machine check handling	Standard	Standard	Standard	Standard
Multiple bus architecture	Standard	Standard	Standard	Standard
Storage protection	Standard	Standard	Standard	Standard
Time-of-day-clock	Standard	Standard	Standard	Standard
Channel command retry	Standard	Standard	Standard	Standard
Channel indirect addressing	Standard	Standard	Standard	Standard
Byte oriented operand feature	Standard	Standard	Standard	Standard
Extended precision floating point	Standard	Standard	Standard	Standard
High speed floating point	No	No	No	No
System/370 Universal Instruction set	Standard	Standard	Standard	Standard
Console audible alarm	Standard	Standard	Standard	Standard
Integrated console printer	Optional	Standard	Optional	Optional
Light pen	Standard	Standard	No	No
Remote console	Optional	Optional	Standard	Standard
Remote data link	No	No	Standard	Standard
Console file	Standard	Standard	Standard	Standard
CPU activity monitor	Standard	Standard	Standard	Standard
Extended control mode	Standard	Standard	Standard	Standard
Program event recording	Standard	Standard	Standard	Standard
Virtual machine assist	Standard	Standard	Standard	Standard
1401/1440/1460 compatibility	Standard	Standard	Standard	Standard
			Standard	Standard
OTHER FEATURES & COMMENTS			Operates in either System/370 or 4300 mode	Operates in either System/370 or 4300 mode

All About Plug-Compatible Mainframes

NAS AS/5000E	NAS AS/5000	NAS AS/6130	NAS AS/6150	MODEL
				PROCESSOR PERFORMANCE
92	92	75	60	Machine cycle time, nanoseconds
IBM 4341-2	IBM 3031	IBM 4341-2	IBM 4341-2	Relative performance*
1.0	1.15	—	—	To
—	—	—	—	Performance of
—	—	—	—	To
AS/5000	—	AS/6150	—	Performance of
				Field Upgradable to
				MAIN STORAGE
NMOS	NMOS	NMOS	NMOS	Storage type
Yes	Yes	Yes	Yes	Checking
Yes	Yes	Yes	Yes	Parity
1	1	—	—	Error detection & correction
—	—	—	—	No. of check bits per byte
460	460	375	300	No. of check bits per word
460	460	375	300	Read cycle, nanoseconds
8	8	8 or 16	8 or 16	Write cycle, nanoseconds
2M	2M	4M	4M	Bytes fetched per cycle
8M	8M	16M	16M	Minimum capacity, bytes
2M	2M	4M	4M	Maximum capacity, bytes
No	No	—	—	Increment size, bytes
—	—	—	—	Interleaving
—	—	—	—	Minimum number of ways
				Maximum number of ways
				BUFFER (CACHE) STORAGE
Bipolar ECL	Bipolar ECL	—	—	Storage type
184	184	150	120	Cycle time, nanoseconds
8	8	4	4	Bytes fetched per cycle
32K	32K	16K	32K	Minimum capacity, bytes
32K	32K	16K	32K	Maximum capacity, bytes
				I/O CHANNELS
—	—	—	—	Selector channels standard
—	—	—	—	Selector channels optional
4	4	5	5	Block multiplexers standard
1	1	0	0	Block multiplexers optional
1	1	1	1	Byte multiplexers standard
1	1	0	0	Byte multiplexers optional
				Subchannels per channel
256	256	256	256	On a block multiplexer
256	256	256	256	On a byte multiplexer
—	—	—	—	On a selector
Optional	Standard	Optional	Optional	Channel to channel adapter
				Maximum channel data rates
1.86M	1.86M	2M	2M	Block multiplexer, bytes/sec.
100K	100K	100K	100K	Byte multiplexer, bytes/sec.
—	—	—	—	Selector channel, bytes/sec.
6.75	6.75M	12M	12M	Aggregate data rate, bytes/sec.
No	Optional	Standard	Standard	Data Streaming
				CONTROL STORAGE
Bipolar ECL	Bipolar ECL	—	—	Storage type
10 to 20	10 to 20	75	60	Access time, nanoseconds
72	72	72	72	Word size, bits
16K	16K	16K	16K	Minimum number of words
16K	16K	16K	16K	Maximum number of words
Instruction microcode, operating system assist	Instruction microcode, operating system assist	Instruction microcode, operating system assist	Instruction microcode, operating system assist	Control storage usage
				PRICING & AVAILABILITY
$350,000	$450,000	$325,000	$390,000	Purchase of CPU with min. memory
Yes	Yes	Yes	Yes	Lease terms offered
Yes	Yes	Yes	Yes	Vendor's
—	—	—	—	Third party
Contact vendor	Contact vendor	Contact vendor	Contact vendor	Lease of CPU with min. memory (1-yr.)
2MB	2MB	4MB	4MB	Memory increment size
$50,000	$50,000	$50,000	$50,000	Memory increment purchase
Yes	Yes	Yes	Yes	Vendor offered maintenance
Yes	Yes	Yes	Yes	Prime time
—	—	—	—	Additional hours
$2,793/mo.	$3,542/mo.	Contact vendor	Contact vendor	24 hour
—	—	—	—	Other plans
NAS	NAS	NAS	NAS	Manufacturer
NAS	NAS	NAS	NAS	Vendor

*As rated by the PCM vendor.

All About Plug-Compatible Mainframes

MODEL	NAS AS/7000N	NAS AS/7000	NAS AS/7000 DPC
SYSTEM PARAMETERS			
Date of introduction	Jan. 1980	Jan. 1980	Jan. 1980
Date of first delivery	2nd Quarter 1980	2nd Quarter 1980	2nd Quarter 1980
Number installed to date	—	—	—
Production status	Active	Active	Active
Operating systems			
DOS/VS	Yes	Yes	No
DOS/VSE	Yes	Yes	No
OS/VS1	Yes	Yes	No
SVS	Yes	Yes	No
MVS	Yes	Yes	Yes
VM/370	Yes	Yes	Yes
VM/SP	Yes	No	Yes
Others	MVS/SP	MVS/SP	MVS/SP
PROCESSING FEATURES			
Virtual storage capability	Standard	Standard	Standard
Processor arrangements			
Uniprocessor	Yes	Yes	—
Attached processor	—	—	—
Front end to	—	—	—
Back end to	—	—	—
Multiprocessor	—	—	Yes
Minimum in complex	—	—	2
Maximum in complex	—	—	2
Clock comparator	Standard	Standard	Standard
CPU timer	Standard	Standard	Standard
Control registers	Standard	Standard	Standard
CPU one-level addressing	Standard	Standard	Standard
Doubleword buffer	Standard	Standard	Standard
Interval timer	Standard	Standard	Standard
Machine check handling	Standard	Standard	Standard
Multiple bus architecture	Standard	Standard	Standard
Storage protection	Standard	Standard	Standard
Time-of-day-clock	Standard	Standard	Standard
Channel command retry	Standard	Standard	Standard
Channel indirect addressing	Standard	Standard	Standard
Byte oriented operand feature	Standard	Standard	Standard
Extended precision floating point	Standard	Standard	Standard
High speed floating point	No	Standard	Standard
System/370 Universal Instruction set	Standard	Standard	Standard
Console audible alarm	Standard	Standard	Standard
Integrated console printer	Standard	Standard	Standard
Light pen	Standard	Standard	Standard
Remote console	—	—	—
Remote data link	No	No	No
Console file	Standard	Standard	Standard
CPU activity monitor	Standard	Standard	Standard
Extended control mode	Standard	Standard	Standard
Program event recording	Standard	Standard	Standard
Virtual machine assist	Standard	Standard	Standard
1401/1440/1460 compatibility	No	No	No
OTHER FEATURES & COMMENTS	A second service processor console is available as an option	A second service processor console is available as an option	Two service processor consoles are standard; a third is optional

All About Plug-Compatible Mainframes

NAS AS/7000N	NAS AS/7000	NAS AS/7000 DPC	MODEL
			PROCESSOR PERFORMANCE
72	72	72	Machine cycle time, nanoseconds
IBM 3031	IBM 3033S	IBM 3033N	Relative performance*
Up to 2.0	1.15	1.25	To
—	—	—	Performance of
—	—	—	To
AS/7000	AS/7000 DPC	No	Performance of
			Field Upgradable to
			MAIN STORAGE
NMOS	NMOS	NMOS	Storage type
Yes	Yes	Yes	Checking
Yes	Yes	Yes	Parity
1	1	1	Error detection & correction
—	—	—	No. of check bits per byte
360	360	360	No. of check bits per word
360	360	360	Read cycle, nanoseconds
8	8	8	Write cycle, nanoseconds
2M	4M	4M	Bytes fetched per cycle
8M	16M	16M	Minimum capacity, bytes
2M	2M	2M	Maximum capacity, bytes
Yes	Yes	Yes	Increment size, bytes
4	4	4	Interleaving
4	4	4	Minimum number of ways
			Maximum number of ways
			BUFFER (CACHE) STORAGE
Bipolar ECL	Bipolar ECL	Bipolar ECL	Storage type
144	144	144	Cycle time, nanoseconds
8	8	8	Bytes fetched per cycle
16K	64K	64K/CPU	Minimum capacity, bytes
16K	64K	64K/CPU	Maximum capacity, bytes
			I/O CHANNELS
—	—	—	Selector channels standard
—	—	—	Selector channels optional
5	6	9	Block multiplexers standard
1	6	14	Block multiplexers optional
1	2	1	Byte multiplexers standard
1	2	5	Byte multiplexers optional
256	256	256	Subchannels per channel
256	256	256	On a block multiplexer
—	—	—	On a byte multiplexer
Standard	Standard	Standard	On a selector
			Channel to channel adapter
1.5M	1.5M	1.5M	Maximum channel data rates
100K	100K	100K	Block multiplexer, bytes/sec.
—	—	—	Byte multiplexer, bytes/sec.
11M	21M	21M	Selector channel, bytes/sec.
Optional	Optional	Optional	Aggregate data rate, bytes/sec.
			Data Streaming
			CONTROL STORAGE
Bipolar ECL	Bipolar ECL	Bipolar ECL	Storage type
10 to 20	10 to 20	10 to 20	Access time, nanoseconds
99	99	99	Word size, bits
6K	6K	6K	Minimum number of words
6K	6K	6K	Maximum number of words
Instruction microcode, operating system assist	Instruction microcode, operating system assist	Instruction microcode, operating system assist	Control storage usage
			PRICING & AVAILABILITY
$950,000	$1,100,000	$1,700,000	Purchase of CPU with min. memory
Yes	Yes	Yes	Lease terms offered
Yes	Yes	Yes	Vendor's
—	—	—	Third party
Contact vendor	Contact vendor	Contact vendor	Lease of CPU with min. memory (1-yr.)
2MB	2MB	2MB	Memory increment size
$100,000	$100,000	$100,000	Memory increment purchase
Yes	Yes	Yes	Vendor offered maintenance
Yes	Yes	Yes	Prime time
—	—	—	Additional hours
$8,000/mo.	$9,280/mo.	$11,708/mo.	24 hour
—	—	—	Other plans
NAS	NAS	NAS	Manufacturer
NAS	NAS	NAS	Vendor

*As rated by the PCM vendor.

All About Plug-Compatible Mainframes

MODEL	NAS AS/9000N	NAS AS/9000-2	NAS AS/9000 DPC
SYSTEM PARAMETERS			
Date of introduction	Jan. 1981	Sept. 1980	Jan. 1981
Date of first delivery	4th Quarter 1981	1981	4th Quarter 1981
Number installed to date	—	—	—
Production status	Active	Active	Active
Operating systems			
DOS/VS	No	No	No
DOS/VSE	No	No	No
OS/VS1	Yes	Yes	No
SVS	No	No	No
MVS	Yes	Yes	Yes
VM/370	Yes	Yes	Yes
VM/SP	Yes	Yes	Yes
Others	MVS/SP	MVS/SP	MVS/SP
PROCESSING FEATURES			
Virtual storage capability	Standard	Standard	Standard
Processor arrangements			
Uniprocessor	Yes	Yes	—
Attached processor	—	—	—
Front end to	—	—	—
Back end to	—	—	—
Multiprocessor	—	—	Yes
Minimum in complex	—	—	2
Maximum in complex	—	—	2
Clock comparator	Standard	Standard	Standard
CPU timer	Standard	Standard	Standard
Control registers	Standard	Standard	Standard
CPU one-level addressing	Standard	Standard	Standard
Doubleword buffer	Standard	Standard	Standard
Interval timer	Standard	Standard	Standard
Machine check handling	Standard	Standard	Standard
Multiple bus architecture	Standard	Standard	Standard
Storage protection	Standard	Standard	Standard
Time-of-day-clock	Standard	Standard	Standard
Channel command retry	Standard	Standard	Standard
Channel indirect addressing	Standard	Standard	Standard
Byte oriented operand feature	Standard	Standard	Standard
Extended precision floating point	Standard	Standard	Standard
High speed floating point	Standard	Standard	Standard
System/370 Universal Instruction set	Standard	Standard	Standard
Console audible alarm	Standard	Standard	Standard
Integrated console printer	Optional	Optional	Optional
Light pen	No	No	No
Remote console	—	—	—
Remote data link	Standard	Standard	Standard
Console file	Standard	Standard	Standard
CPU activity monitor	Standard	Standard	Standard
Extended control mode	Standard	Standard	Standard
Program event recording	Standard	Standard	Standard
Virtual machine assist	Standard	Standard	Standard
1401/1440/1460 compatibility	No	No	No
OTHER FEATURES & COMMENTS	A second service processor console is available as an option	A second service processor console is available as an option	Two service processor consoles are standard; two additional consoles are optional

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NAS AS/9000N	NAS AS/9000-2	NAS AS/9000DPC	MODEL
			PROCESSOR PERFORMANCE
48	38	38	Machine cycle time, nanoseconds
IBM 3033U	IBM 3033U	IBM 3081	Relative performance*
1.1 to 1.3	1.5 to 1.6	1.4	To
—	—	—	Performance of
—	—	—	To
AS/9000-2	AS/9000 DPC	—	Performance of
			Field Upgradable to
			MAIN STORAGE
NMOS	NMOS	NMOS	Storage type
Yes	Yes	Yes	Checking
Yes	Yes	Yes	Parity
1	1	1	Error detection & correction
—	—	—	No. of check bits per byte
336	266	266	No. of check bits per word
288	228	228	Read cycle, nanoseconds
8	8	8	Write cycle, nanoseconds
4M	12M	16M	Bytes fetched per cycle
24M	32M	32M	Minimum capacity, bytes
4M	4M	4M	Maximum capacity, bytes
Yes	Yes	Yes	Increment size, bytes
8	8	16	Interleaving
8	8	16	Minimum number of ways
			Maximum number of ways
			BUFFER (CACHE) STORAGE
Bipolar ECL	Bipolar ECL	Bipolar ECL	Storage type
96	76	76	Cycle time, nanoseconds
8	8	8	Bytes fetched per cycle
32K	64K	64K/CPU	Minimum capacity, bytes
32K	64K	64K/CPU	Maximum capacity, bytes
			I/O CHANNELS
—	—	—	Selector channels standard
—	—	—	Selector channels optional
5	9	12	Block multiplexers standard
10	14	18	Block multiplexers optional
1	1	1	Byte multiplexers standard
3	5	7	Byte multiplexers optional
			Subchannels per channel
256	256	256	On a block multiplexer
256	256	256	On a byte multiplexer
—	—	—	On a selector
Optional	Optional	Optional	Channel to channel adapter
			Maximum channel data rates
1.5M	1.5M	1.5M	Block multiplexer, bytes/sec.
100K	100K	100K	Byte multiplexer, bytes/sec.
—	—	—	Selector channel, bytes/sec.
21M	21M	80M	Aggregate data rate, bytes/sec.
Optional	Optional	Standard	Data Streaming
			CONTROL STORAGE
Bipolar ECL	Bipolar ECL	Bipolar ECL	Storage type
5.5	5.5	5.5	Access time, nanoseconds
160	160	160	Word size, bits
16K	16K	16K	Minimum number of words
16K	16K	16K	Maximum number of words
Instruction microcode, operating system assist	Instruction microcode, operating system assist	Instruction microcode, operating system assist	Control storage usage
			PRICING & AVAILABILITY
$1,950,000	$2,750,000	$4,150,000	Purchase of CPU with min. memory
Yes	Yes	Yes	Lease terms offered
Yes	Yes	Yes	Vendor's
—	—	—	Third party
Contact vendor	Contact vendor	Contact vendor	Lease of CPU with min. memory (1-yr.)
4MB	4MB	4MB	Memory increment size
$100,000	$100,000	$100,000	Memory increment purchase
Yes	Yes	Yes	Vendor offered maintenance
Yes	Yes	Yes	Prime time
—	—	—	Additional hours
$9,953/mo.	$11,450/mo.	$12,995/mo.	24 hour
—	—	—	Other plans
Hitachi	Hitachi	Hitachi	Manufacturer
NAS	NAS	NAS	Vendor

*As rated by the PCM vendor.

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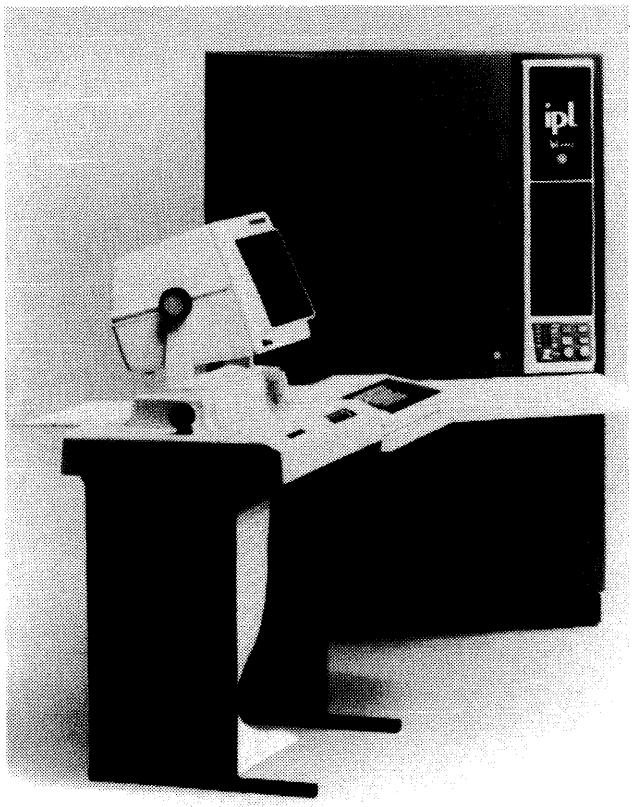

IPL Systems has been making PCMs since 1977, and the systems have been marketed worldwide by such firms as Control Data and Olivetti. In late 1980, IPL announced its own end-user family of PCMs, the 4400 Series. The product line, which includes the IPL 4436, 4443 (shown here), 4445, and 4446, compete with the IBM 4300 Series, have memory sizes ranging from one to 16 megabytes, and include from three to six channels.

⊳ Manufacturers/Vendors

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Telephone (408) 746-6000

Cambex Corporation
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Telephone (617) 890-6000

Control Data Corporation
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Minneapolis, Minnesota 55440
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IPL Systems Inc.
360 Second Avenue
Waltham, Massachusetts 02154
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Magnuson Systems Corporation
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National Advanced Systems
800 East Middlefield Road
Mountain View, California 94043
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