NAS AS/EX Series

PRODUCT DESCRIPTION

National Advanced Systems (NAS) overhauled its medium-to-large, IBM-compatible mainframe line with the announcement of the 15-model AS/EX Series. Introduced in September 1988, the AS/EX line replaces the previous AS/VL midrange line and the AS/XL high-end mainframe line. NAS announced the new series in response to the 1988 introductions of the IBM ES/3090 S models and the Amdahl 5990 models.

The AS/EX merges and extends the growth path of existing VL and XL models. The unified line offers users a twentyfold growth path from the entry-level to the top-end model. The medium-range models, Models 20 through 40, are renamed VL models.

NAS also added two more mid-level models, the AS/EX 10 and the AS/EX 35. The Model 10 lowers the entry point into the series. The Model 35, positioned between the Model 30 and Model 40 and rated at 14.9 million instructions per second (MIPS), adds a new price/performance increment to the midrange level. The addition of the Model 35 makes the upgrade to the next larger processor less intimidating. Before introducing the Model 35, Model 30 users planning to upgrade had to move directly to the Model 40, which sells for two times the cost of a Model 30.

AS/EX Models 50 through 100 are higher performance versions of the AS/XL Models 50 through 100. To improve performance for Models 50 through 100, NAS reduced CPU cycle time from 18 to 16.5 nanoseconds, expanded maximum system-wide cache capacity from two to eight megabytes, and incorporated new semiconductor ▷

PRODUCT ANNOUNCED: NAS AS/EX Series.

COMPETITION: Amdahl 5890 and 5990 Series; IBM ES/9370 Information System, ES/4381 Series, and IBM ES/3090 Series.

DATE ANNOUNCED: September 1988.

SCHEDULED DELIVERY: Models 20, 25, 30, and 40, September 1988; Models 50 through 100, fourth-quarter 1988; Models 10 and 35, first-quarter 1989.

BASIC SPECIFICATIONS

MANUFACTURER: National Advanced Systems, 750 Central Expressway, P.O. Box 54996, Santa Clara, California 95054-0996. Telephone (408) 970-1000. Canadian address: NAS, Two Lansing Square, Suite 1101, Willowdale, Ontario M2J 4P8. Telephone (416) 494-4114.

MODELS: Models AS/EX 10, 20, 25, and 30, single processors; Models AS/EX 35 and 40, dual processors; Models AS/EX 50 and 60, single processors; Models AS/EX 65, 70, 75, and 80, dual processors; Model AS/EX 90, triple processor; Models AS/EX 95 and 100, quad processors.

CONFIGURATION: Models AS/EX 10 and 20 single processors can be configured with 32 to 256 megabytes of main memory, up to 192 megabytes of optional Expanded Storage, and 8 to 32 channels. ▶
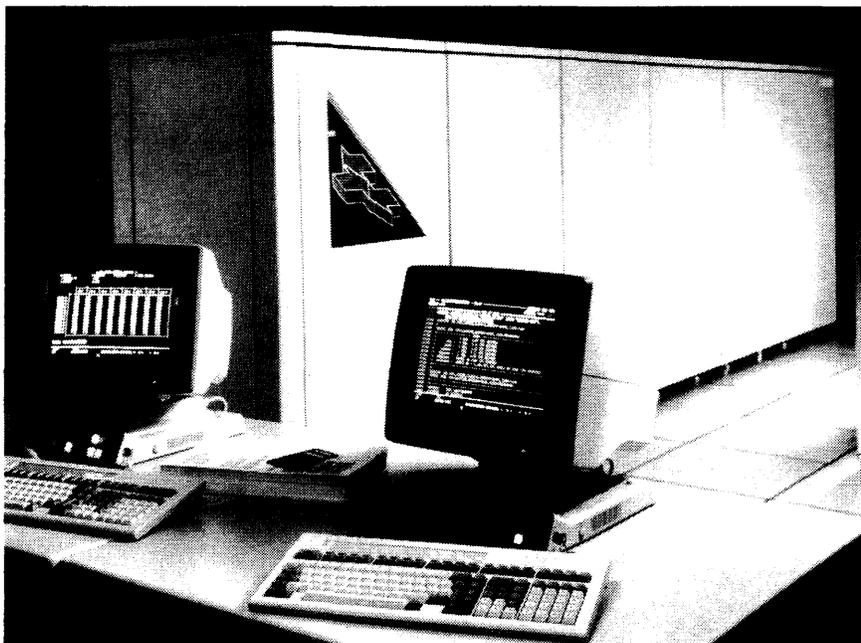
The top-of-the-line AS/XL Series is available in single-, dual-, triple- and quad-processor models. Memory ranges from 32 megabytes to 2 gigabytes; 16 to 128 channels can be attached. A three-level memory system features a large, 12-nanosecond Dynamic Working Storage (DWS) buffer that sits between main memory and an ultrafast 4.5-nanosecond CPU cache. DWS, which ranges from 512 kilobytes to 2 megabytes in size, can also be accessed by the I/O subsystem.

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▷ memory and logic components. Refer to the CHARACTERISTICS section for more details.

As a result of these changes, the top-end AS/EX 100 multiprocessor—compared to the previous AS/XL 100—has 30 percent better performance in commercial data base applications, NAS claims. The AS/EX 60 single processor will have from 1.15 to 1.25 times the internal throughput of the AS/XL version.

The Models 50 through 100 feature an optional vector processing capability for handling numeric-intensive applications. With the introduction of AS/EX models, NAS claims numeric-intensive computing performance was also improved. The AS/EX 60 has 28 percent better performance in numeric-intensive environments compared to the AS/XL 60. The AS/EX 60 is rated at 49 million floating-point operations per second by the LINPACK benchmark.

The AS/EX Models 20, 25, 30, and 40 became available in September 1988 and the Models 50 through 100 became available during fourth-quarter 1988. Volume shipment of the new Models 10 and 35 and the rest of the series began during the first quarter.

RELATIONSHIP TO CURRENT PRODUCT LINE: With the exception of some notable performance improvements at the high end of the model line, the AS/EX models are similar in many respects to the former AS/VL and AS/XL models. For example, memory and channel capacities of the previous processors and their EX counterparts are similar in most instances. NAS, however, did improve Dynamic Working Storage (DWS) capacities. DWS capacities now range from 256 kilobytes to 8 megabytes. On the previous models, DWS ranged from 256 kilobytes to 2 megabytes.

Additionally, the EX models incorporate enhancements introduced earlier last year for previous AS models. These include logical partitioning, an Optical Channel Subsystem (OCS), and an AS/Control Facility. Logical partitioning lets users divide a mainframe four ways. Each partitioned section is assigned an operating system and system resources. The AS/Control Facility lets users control NAS storage subsystems from remote locations. The OCS lets users attach peripheral devices and backup CPUs up to two kilometers from a CPU host, overcoming traditional cable-length restrictions. Users can attach NAS 7380 disk drives, a 7900 Semiconductor Disk, the NAS 7480 tape cartridge unit, and IBM-compatible devices to the EX line.

To attract new customers and to encourage existing customers to upgrade, NAS now offers 33 upgrade options. Customers can choose from vertical, horizontal, diagonal, and transitional upgrades. Horizontal upgrades let users upgrade from a VL or XL machine to an equivalent EX machine. Vertical upgrades let users upgrade to the next larger EX machine beginning with the entry-level Model ▷

▶ Models AS/EX 25 and 30 single processors can be configured with 32 to 256 megabytes of main memory, 256 kilobytes of Dynamic Working Storage (DWS), up to 192 megabytes of optional Expanded Storage, and 8 to 32 channels.

Models AS/EX 35 and 40 dual processors can be configured with 32 to 256 megabytes of main memory, 256 kilobytes of DWS, up to 192 megabytes of Expanded Storage, and 8 to 32 channels.

Models AS/EX 50 and 60 single processors can be configured with 64 megabytes to 1 gigabyte of main memory, 1 megabyte of DWS, up to 960 megabytes of Expanded Storage, and 32 to 64 channels.

The Model AS/EX 65 dual processor can be configured with 256 megabytes to 2 gigabytes of main memory, 2 megabytes of DWS, up to 1920 megabytes of Expanded Storage, and 32 to 96 channels.

The Model AS/EX 70 dual processor can be configured with 64 megabytes to 1 gigabyte of main memory, 1 megabyte of DWS, up to 960 megabytes of Expanded Storage, and 32 to 64 channels.

The Model AS/EX 75 dual processor can be configured with 256 megabytes to 2 gigabytes of main memory, 8 megabytes of DWS, 1920 megabytes of Expanded Storage, and 64 to 128 channels.

The Model AS/EX 80 dual processor can be configured with 64 megabytes to 1 gigabyte of main memory, 4 megabytes of DWS, up to 960 megabytes of Expanded Storage, and 32 to 64 channels.

The Model AS/EX 90 triple processor can be configured with 128 megabytes to 2 gigabytes of main memory, 8 megabytes of DWS, up to 1920 megabytes of Expanded Storage, and 48 to 128 channels.

Models AS/EX 95 and 100 quad processors can be configured with 256 megabytes to 2 gigabytes of main memory, 8 megabytes of DWS, up to 1920 megabytes of Expanded Storage, and 64 to 128 channels.

CENTRAL PROCESSOR AND MEMORY: The 15 air-cooled mainframes feature from one to four CPUs containing both scalar and vector processors. Processors incorporate 2,000- and 5,000-gate bipolar logic and 40,000-gate CMOS logic. They also use hybrid logic-in-memory components of 512 kilobits, plus 700 logic gates to reduce single paths and enhance throughput. Memory elements use 64-kilobit BiCMOS static RAMs (SRAM) and 1-megabit dynamic RAMs (DRAM).

A special logical partitioning feature lets users create up to four logical, asymmetrical parts. Each part can be assigned its own operating system and physical resources.

In addition to main memory (up to two gigabytes), the AS/EX Series also features optional Expanded Memory to ease the paging load characteristic of virtual memory environments. Users can allocate Expanded Memory by partitioning real memory.

Dynamic Working Storage (DWS), a third memory category, is located between the cache buffer and main storage. DWS reduces access times for the I/O processors and instruction processors. Capacity ranges from 256 kilobytes to 8 megabytes.

INPUT/OUTPUT SUBSYSTEM: The AS/EX line features a data transfer rate of 4.5 megabytes per second or ▶ 6.0 megabytes per second. To augment its channel sub-

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▷ 10. Diagonal upgrades let users upgrade from a VL or XL machine to a more powerful EX machine.

Transitional upgrades, a new category, let NAS midrange customers upgrade to a larger AS/EX model. While this upgrade involves a processor swap-out, customers retain investments in memory, channels, optical channels, and AS/CF products. Users only pay for the actual upgrade. The transitional option applies to an AS/EX 30 to AS/EX 60 upgrade and to an AS/EX 40 to AS/EX 80 upgrade.

COMPETITIVE POSITION: The AS/EX Series is NAS' expected response to the IBM ES/3090 S models and the Amdahl 5990 Series. Overall, the rejuvenated model line offers a 15 to 25 percent performance boost over the previous NAS mainframe offerings. Performance ranges from 4.5 million instructions per second (MIPS) for the entry-level system to 88 MIPS for the top-end Model 100.

Despite the performance boost, the new NAS line received a lukewarm response from industry analysts when it was announced last year largely because the top-end model falls short of comparable IBM and Amdahl top-end performance. The comparable IBM and Amdahl top-end mainframes are rated at between 105 and 115 MIPS, more than enough to finally break the 100-MIPS barrier.

To further add to NAS' woes, the IBM-compatible vendor continues to experience a slower demand for mainframes and shrinking profits stemming from sharp price cutting. NAS' problems have been impacting the vendor's parent company, National Semiconductor. In September 1988, National reported a quarterly loss that reflected problems with its troubled NAS subsidiary. Financial losses led to rumors that National was planning to sell off NAS, speculation that NAS has denied.

The current difficulties illustrate a problem basic to vendors that offer faster and cheaper versions of a comparable IBM product; such vendors have found they cannot live by better price/performance alone. To further diver-

sify its product line and to make itself more than just a price/performance alternative to IBM, NAS, like Amdahl, has been offering additional mainframe features such as logical partitioning, remote computing, and optical channels. NAS also offers a line of IBM-compatible, triple-density disk and cartridge tapes, obtained from Hitachi, in addition to communications products. Similar to Amdahl, NAS also plans to bring out a UNIX product in collaboration with Sun Microsystems.

NAS also builds up reserves of customer loyalty by providing customers with service and support superior to IBM. NAS continues to earn high marks in these categories, according to the 1988 Datapro users survey. □

▶ system, NAS features an integrated Optical Channel Subsystem (OCS), which allows high-speed storage units to be located up to 1.25 miles (2 kilometers) from the host mainframe. The optical channel option lets users configure hardware over several floors or buildings. Without the optical channel feature, equipment must be kept within the same room because of cable length restrictions. Solidstate devices such as the NAS 7900 Semiconductor Disk Subsystem can be installed up to two kilometers from the CPU, and hard disk devices such as the NAS 7380 can be extended up to one kilometer.

SOFTWARE: All AS/XL Series processors are IBM plug compatible and can run any IBM-compatible software, providing the processor implements the operating mode (System/370 or 370-XA) required by that software. For detailed information on IBM software, see the CHARACTERISTICS section of the IBM 3090 product report (Report 70C-504MK-701) in this tab.

OPERATING SYSTEM: The AS/EX Series offers complete functional compatibility with IBM's MVS/XA operating system software. Additionally, NAS announced it would support IBM's Enterprise System Architecture/370 (ESA/370) by the fourth quarter of 1989 in addition to VM/XA environments, VSE in logical partitions, and UNIX systems. As on the 3090, older OS/VS1, MVS versions, VM versions, DOS/VS, and DOS/VSE operating systems cannot run standalone but can run under a 3090-compatible version of VM.

EQUIPMENT PRICES

		Purchase Price ($)	Monthly Maint.* ($)
PROCESSORS			
AS/EX 10	Single processor; 32 megabytes of main memory, 8 channels	489,200	733
AS/EX 20	Single processor; 32 megabytes of main memory, 8 channels	560,200	975
AS/EX 25	Single processor; 32 megabytes of main memory, 8 channels	749,650	1,462
AS/EX 30	Single processor; 32 megabytes of main memory, 8 channels	1,177,150	1,949
AS/EX 35	Single processor; 32 megabytes of main memory, 8 channels	1,529,050	2,632
AS/EX 40	Dual processor; 32 megabytes of main memory, 8 channels	2,243,350	3,510
AS/EX 50	Single processor; 64 megabytes of main memory, 16 channels	2,304,300	5,275
AS/EX 60	Single processor; 64 megabytes of main memory, 32 channels	3,450,100	7,373
AS/EX 65	Dual processor; 256 megabytes of main memory, 32 channels	5,647,950	11,020
AS/EX 70	Dual processor; 64 megabytes of main memory, 32 channels	3,766,900	8,837
AS/EX 75	Dual processor; 256 megabytes of main memory, 64 channels	7,148,200	13,957
AS/EX 80	Dual processor; 64 megabytes of main memory, 32 channels	4,932,400	10,908
AS/EX 90	Triple processor; 128 megabytes of main memory, 48 channels	8,406,200	16,933
AS/EX 95	Quad processor; 256 megabytes of main memory, 64 channels	8,944,400	16,375
AS/EX 100	Quad processor; 256 megabytes of main memory, 64 channels	9,550,000	20,219

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	Purchase Price ($)

PROCESSOR UPGRADES

Vertical Upgrades:

AS/EX 10 to AS/EX 20	137,650
AS/EX 20 to AS/EX 25	189,900
AS/EX 25 to AS/EX 30	428,850
AS/EX 30 to AS/EX 35	421,550
AS/EX 35 to AS/EX 40	851,500
AS/EX 30 to AS/EX 60	2,072,150
AS/EX 40 to AS/EX 80	2,188,000
AS/EX 50 to AS/EX 60	735,250
AS/EX 50 to AS/EX 65	1,932,000
AS/EX 50 to AS/EX 70	1,286,300
AS/EX 60 to AS/EX 75	2,444,900
AS/EX 60 to AS/EX 80	1,752,100
AS/EX 65 to AS/EX 75	1,500,250
AS/EX 70 to AS/EX 80	1,217,500
AS/EX 70 to AS/EX 95	3,628,550
AS/EX 75 to AS/EX 90	1,549,250
AS/EX 80 to AS/EX 90	2,019,450
AS/EX 80 to AS/EX 100	4,350,000
AS/EX 90 to AS/EX 100	2,330,550
AS/EX 95 to AS/EX 100	1,940,700

Horizontal Upgrades:

AS/XL 50 to AS/EX 50	742,000
AS/XL 50M to AS/EX 65	990,550
AS/XL 60 to AS/EX 60	938,000
AS/XL 60M to AS/EX 75	1,252,850
AS/XL 70 to AS/EX 70	893,100
AS/XL 70M to AS/EX 95	1,967,850
AS/XL 80 to AS/EX 80	1,412,700
AS/XL 90 to AS/EX 90	1,644,850
AS/XL 100 to AS/EX 100	2,123,900

Diagonal Upgrades:

AS/XL 50 to AS/EX 60	735,800
AS/XL 50 to AS/EX 65	2,329,650
AS/XL 50 to AS/EX 70	1,707,100
AS/XL 50M to AS/EX 75	1,345,850
AS/XL 60 to AS/EX 75	2,947,700
AS/XL 60 to AS/EX 80	2,303,400
AS/XL 60M to AS/EX 90	2,466,800
AS/XL 70 to AS/EX 80	1,612,300
AS/XL 70 to AS/EX 95	3,994,800
AS/XL 80 to AS/EX 90	3,432,150
AS/XL 80 to AS/EX 100	5,000,200
AS/XL 90 to AS/EX 100	2,915,550

MEMORY UPGRADES AND ADDITIONAL FEATURES

	Purchase Price ($)	Monthly Maint.* ($)
Additional Memory Increment; 32 megabytes (AS/EX 10 through 40 models only)	197,000	236
Additional Memory Increment; 64 megabytes	394,000	472
Additional Memory Increment; 128 megabytes	788,000	944
Expanded Memory Feature; includes 64-megabyte memory	394,000	473
Additional Channels; 8 channels (AS/EX 10 through 40 models only)	117,000	152
Additional Channels; 16-channel group	247,000	304
Six-megabyte-per-second channel feature; for 7900-2X or 7480	NC	NA
Additional Console	25,270	226
Remote Master Console	36,800	226
Channel-to-Channel Adapter	14,000	41
Advanced System Control Facility	25,000	213
Optical Channel Subsystem; two channels	187,000	189
Optical Channel/Additional Peripheral Interface Unit; two channels	91,600	92
Optical Channel; additional two channels	60,000	92
Vector Processor Facility	365,000	341

*Complete service for 24 hours/day, 7 days/week.
NA—Not applicable.
NC—No charge.

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		Purchase Price ($)	Monthly Maint.* ($)
MASS STORAGE			
7380	Model AD single-density, 3380-type, upgradable master disk drive with dual port	77,900	304
	Model BD single-density, 3380-type, upgradable add-on disk drive with dual port	56,050	221
	Model AE dual-capacity disk drive with dual port	107,350	304
	Model BE dual-capacity disk drive with dual port	85,500	221
	Model AJ single-capacity master disk drive with quad port	77,900	232
	Model BJ single-capacity add-on disk drive with quad port	56,050	170
	Model AJX double-capacity master disk drive	107,350	232
	Model BJX double-capacity add-on disk drive	85,500	170
	Model AK triple-capacity master disk drive with quad port	121,600	232
	Model BK triple-capacity add-on disk drive with quad port	99,750	170
	7380 Upgrades:		
	Model AD to Model AE	38,000	NC
	Model AJ to Model AK	57,000	NC
	Model AJ to Model AJX	40,000	NC
	Model AJX to Model AK	45,000	NC
Controllers			
7880-3	Disk controller	48,450	181
7880-3C	Disk controller with 8-megabyte cache and two-channel switch	93,100	592
	7880 Features:		
	Two-channel switch	4,275	11
	Additional two-channel switch	11,400	40
	Eight-channel switch	15,685	56
	Additional 8 megabytes of cache memory for Model 3C	26,600	26
	Additional 16 megabytes of cache memory for Model 3C	53,200	52
	Model D to Model E Support Controller Upgrade	NC	NC
	Model J to Model K Support Controller Upgrade	NA	NC
	4.5-megabyte-per-second upgrade for Model 3C	NA	NC
7980	Model 1 Controller	57,000	191
	Model 2 Controller	104,500	381
	Model 3C Controller; 32 megabytes	190,000	824
	7980 Features:		
	Four-channel switch	17,100	41
	Additional 32-megabyte cache memory for Model 3C	106,400	77
7900	Semiconductor Disk Subsystem:		
7970-2	Controller	78,600	193
7970-3	Controller	87,750	193
7970-4	Controller	51,835	193
7990-4M	Storage Unit; 32 megabytes	83,750	779
7990-1X	Storage Unit; 32 megabytes are standard	128,100	769
7990-2X	Storage Unit; 128 megabytes are standard	382,800	1,146
	7990-1X Features:		
	Two-channel switch, additional pair	11,500	40
	32-megabyte increment; upgrade to 7990-1X	84,900	126
	128-megabyte increment; upgrade to 7990-2X	339,600	503
	Quad port	20,100	NA
	7900-4 Features:		
	Additional two-channel switch pair	10,300	40
	32-megabyte to 64-megabyte upgrade	44,535	126
	64-megabyte to 128-megabyte upgrade	88,735	252
	128-megabyte to 256-megabyte upgrade	177,140	503
	Additional Disk	10,705	103
	Quad Port	9,625	80
MAGNETIC TAPE EQUIPMENT			
7480	Model B22 Drive Unit	41,000	264
	Model A22 Controller	62,000	423
	Model B22 Controller	41,000	264
	Additional Channel Attachment	5,495	20
	Data Compression	12,200	67
	Dual Control Coupler	3,845	NC
	Auto Cartridge Magazine Loader	8,455	40

*Complete service for 24 hours/day, 7 days/week.
NA—Not applicable.
NC—No charge.

SOFTWARE PRICES

	Purchase Price ($)	Annual Maint. ($)
NAS*NET	55,000	1,956
DECnet Option	15,000	NC
NAS*LINK	55,000	6,000
Task to Task	17,500	600
E-Mail; VM only	40,000	3,000
3270 Emulator; MVS only	5,500	400
VT Emulator	10,500	800
NAS*COMPUTE; MVS only	60,000	6,500
NAS*LIB	1,000	NC
Vast-E	15,000	NC
Math Advantage	15,000	NC

NC—No charge. ■