Amdahl 470 Systems

New Product Announcement

Less than a week after IBM's introduction of its large scale 3081 processor and entry-level 3033, the Model Group S, Amdahl Corporation announced a new family of large-scale processors, the 580 Series, and an entry level model to its 470V/7 product line, the 470V/7C. The new systems offer price/performance improvements over their IBM counterparts while maintaining Amdahl's high technology standards. Amdahl also announced sweeping price cuts on its 470 systems as well as increased memory expansion.

580 SERIES PROCESSORS: Amdahl's most powerful uniprocessor, the 580 Model 5860, was introduced on November 18, 1980. Like the 470 family of processors, it is fully compatible with the IBM System/370 instruction set as well as the entire 470 product line. It represents a large-scale growth path for existing Amdahl 470 users. Also announced was a tightly-coupled dual processor version of the 580, the Model 5880. An Amdahl spokesman told Datapro the 5880 differs very little from the single-processor 5860, and the 5860 can be field upgraded to the 5880.

The Model 5860 has twice the performance of Amdahl's former top-end system, the 470V/8, giving it an execution speed of approximately 13 MIPS (million instructions per second). The dual-processor Model 5880 is rated at about 22 MIPS, or about 3.5 times as powerful as the 470V/8. IBM's 3081, a dual-processor system in its basic configuration, is rated at about 10 MIPS. The new systems have 16 megabytes of main memory, expandable to 32 megabytes in 8-megabyte increments. Both systems are equipped with 16 block multiplexer and 2 byte multiplexer channels. An additional 16 block multiplexer channels can be added to each system.

The performance increases of the 580 are made possible through improvements in system design, technology, and packaging, according to Amdahl. The processor incorporates a five-phase pipeline design which reduces the number of machine cycles per instruction. This technique produces a maximum execution rate of one instruction per cycle. The 470 systems, for comparison, execute at one instruction per two cycles. The processor cycle time in the 580 is 24 nanoseconds. Data paths are eight bytes wide, compared to four bytes in the 470, and the 580 uses a dual bus structure to interconnect all functional units. Two 32K high-speed buffers (HSB), using the 470 "non-store-through" technique, permit data to be modified in the buffer rather than in main storage. One HSB is used for rapid access to instructions and the other HSB is for fast access to data—a method Amdahl says reduces the interference between the instruction fetching and execution activities. The system's block multiplexer channels all support the Data Streaming feature, and can transmit data at up to six megabytes per second. The initial Input/Output Processor (IOP), with 16 block multiplexer channels, has a maximum aggregate data rate of 50 megabytes per second. Higher data rates can be obtained by adding a second IOP. Up to 256 subchannels are available on every channel, and subchannel queuing is provided in high I/O contention situations.

Extensive use of LSI technology and component packaging contributes to the system's overall performance. The 580 systems, like the 470, are all air-cooled. The LSI chips used in the 580 have a higher density than those in the 470, but generate about the same heat. High-speed 4K RAM modules are used for microcode control stores, registers, and HSBs. These RAMs, plus the LSI chips, are intermixed on Multiple Chip Carriers (MCC) that can implement an entire system function. Within each MCC are 14 layers into which up to 121 LSI chips and RAM modules can be mixed. Only eight MCCs are needed for a basic 580, including five for the CPU, and one each for the IOP, Console Processor, and Memory Bus Controller (MBC). A ninth MCC is required when increasing the channels from 18 to the maximum 34. Up to 13 MCCs can be accommodated in the LSI "stack", a 5.6 cubic foot enclosure with its two side walls made up of printed circuit boards for interconnecting the MCCs. The 580 employs a dual-bus design with eight-byte data paths. The A-Bus carries data from the console, IOP, and CPU to the MBC, which manages the system's memory activities. The B-Bus returns data to these three components from the MBC.

System compatibility is a key element of the Amdahl 580. To provide increased flexibility in this important area, the 580 uses Distributed Microcode on its Instruction Unit (I-Unit), Execution Unit (E-Unit), IOP, MBC, and the console. Amdahl claims this approach results in shorter data paths and reduced contention. The microcode control store, typically centralized, is now distributed to the same MCC as the functional unit it controls. The performance of each functional unit can then be customized for optimum performance. Another factor, I/O protocol com-

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patibility, is reduced to a single PCB, the Channel Interface Handler. Modifications to accommodate protocol changes are made simply by updating the Channel Interface Handler. A new hardware/firmware product called Macrocode supports the machine check and channel check capabilities of the 580. Amdahl indicated that Macrocode will play an important role in implementing future system compatibility techniques.

System reliability, availability, and serviceability are performed via several methods: 1) Advanced error-checking and correction (ECC) circuitry, such as main memory ECC, buffer ECC, bus parity checking, E-Unit parity and residue checking, and instruction retry; 2) history RAMs which record bus and microcode transactions on an audit trail; 3) diagnostic circuitry integral with each MCC, and 4) improved component packaging, particularly in the MCC.

Centralized system maintenance and troubleshooting are provided by the 580 Console Complex. Console maintenance features include 1) Scan-In/Scan-Out to record and recreate a particular condition; 2) isolation of faulty components at the console; 3) execution of diagnostic routines by the console; 4) error logging; 5) access to Hardware History Tables to assist in fault analysis; 6) Dynamic Error Analysis to analyze the error logs; and 7) dynamic monitoring of selected I/O channels. The 580 can access the Amdahl Diagnostic Assistance Center (AMDAC) the same as 470 users.

The 580 systems are completely compatible with IBM System/370 operating systems; in particular MVS/SP Releases 1, 2, and 3, VM/SP Release 1, and ACP, as well as all other available Amdahl software products.

Amdahl is leaving no doubts about the future potential of the 580 Series. Memories larger than the present 32 megabytes are definitely in the wings, according to an Amdahl spokesman. The systems presently are designed with 16K memory chips, but improved availability and price for 64K chips could open the door to much larger memories, he said. The new Macrocode firmware has the potential for more sophisticated configurations, he added.

The initial deliveries of the 580 Model 5860 are scheduled for April, 1982, compared to fourth quarter 1981 for the IBM 3081. The larger 580 Model 5880 is scheduled for second quarter 1983.

MODEL 470V/7C: In keeping with Amdahl's strategy of matching IBM stride-for-stride, they also introduced the entry-level 470V/7C system. It competes with IBM's 3033 Model Group S, and is a uniprocessor with all the operating components of the 470 family of systems. It has 45 to 50 percent of the performance of the 470V/7, which gives it a rating of about 2.7 MIPS (million instructions per second). With a basic purchase price of $1,050,000 for a four-megabyte, eight-channel system, the 470V/7C is 8 percent more powerful than the IBM 3033 Model Group S, at about 12 percent less cost.

The new system is fully field upgradeable to the various other members of the 470 family, the 470V/7B, then the 470V/7A, 470V/7, and ultimately the 470V/8.

The 470V/7C can be expanded to eight megabytes of main storage. Each of its eight I/O channels can have up to 256 subchannels. The system has a 29-nanosecond processor cycle time and a 32K High Speed Buffer (HSB) for assuring fast program execution. The 470/Accelerator is also available as a leased option.

IBM System/370 operating systems are fully supported on the 470V/7C. The system supports MVS/SP, VM/SP, ACP, SVS, and VS1. IBM's MVS/SE control program product can execute on the 470V/7C when Amdahl's MVS/SE Assist program is also installed.

The new system will be manufactured at Amdahl's plants in Sunnyvale and Dublin, Ireland. The first shipments are scheduled for the third quarter of 1981.

4705 COMMUNICATIONS PROCESSOR: In an October 14, 1980 announcement, Amdahl unveiled its 4705 Communications Processor, a high performance system more powerful yet

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program-compatible with IBM's 3705-II. Amdahl claims its benchmark tests of the 4705 show an aggregate data rate up to 1.8 times that of a similarly configured IBM 3705-II Model F8.

The new controller has 64K bytes of memory, and is expandable to 512K in 64K-byte increments. Up to 352 communications lines can be connected to the 4705, with transmission speeds up to 56,000 bps possible. As many as four CPUs can be connected to a 4705 through a special adapter. Host channels can be either byte multiplexer, block multiplexer, or selector-type.

Communications features include support for the following access methods—BTAM, QTAM, TCAM, VTAM, ACF, and MSNF. The 4705 is compatible with IBM's SNA network architecture and handles the following protocols: BSC, SDLC, and start/stop. Communications lines can have the following characteristics: half- or full-duplex, EIA RS-232-C and CCITT V.24 and V.35.

The 4705 also features on-line and stand-alone diagnostics, instruction lookahead, instruction retry, and automatic fault isolation. The system is scheduled for deliveries beginning in November 1980.□

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.*	2-Year Lease	4-Year Lease
PROCESSORS AND MAIN MEMORY					
5860	CPU Complex; includes two 32K-byte buffer storage units, console with maintenance processor, power distribution unit; main memory and channels as listed below.				
	With 16,777,216 bytes of main memory and:				
	16 channels	$3,800,000	$ 9,850	$110,375	$ 88,300
	24 channels	3,950,000	10,050	115,125	92,100
	32 channels	4,100,000	10,250	119,875	95,900
	With 25,165,824 bytes of main memory and:				
	16 channels	4,000,000	10,250	116,125	92,900
	24 channels	4,150,000	10,450	120,875	96,700
	32 channels	4,300,000	10,650	125,625	100,500
	With 33,554,432 bytes of main memory and:				
	16 channels	4,200,000	10,650	121,875	97,500
	24 channels	4,350,000	10,850	126,625	101,300
	32 channels	4,500,000	11,050	131,375	105,100
5880	Dual CPU Complex; includes two 32K-byte buffer storage units, console with maintenance processor, power distribution unit; main memory and channels as listed below:				
	With 33,554,432 bytes of main memory and:				
	36 channels (only configuration given)	7,500,000	NA	NA	NA
470V/7C	CPU Complex; includes 32K-byte buffer storage, console with maintenance processor, and power distribution unit; main memory and channels as indicated below:				
	With 4,194,304 bytes of main memory and:				
	8 channels	1,050,000	7,650	55,025	42,500
	With 8,388,608 bytes of main memory and:				
	8 channels	1,200,000	9,550	67,425	52,150

*Includes 24-hour/7-day service; applies to both purchased and leased systems.

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		Purchase Price	Monthly Maint.*	2-Year Lease	4-Year Lease
PROCESSORS AND MAIN MEMORY (Continued)					
470V/7B	CPU Complex; includes 32K-byte buffer storage, console with maintenance processor, and power distribution unit; main memory and channels as indicated below.				
	With 4,194,304 bytes of main memory and:				
	8 channels	1,250,000	9,240	57,475	44,635
	12 channels	1,400,000	9,740	64,600	50,285
	16 channels	1,550,000	10,240	71,725	55,935
	With 8,388,608 bytes of main memory and:				
	8 channels	1,400,000	11,140	68,875	54,285
	12 channels	1,550,000	11,640	77,000	59,935
	16 channels	1,700,000	12,140	84,125	65,585
	With 12,582,912 bytes of main memory and:				
	8 channels	1,550,000	13,040	82,175	63,935
	12 channels	1,700,000	13,540	89,300	69,585
	16 channels	1,850,000	14,040	96,425	75,235
	With 16,777,216 bytes of main memory and:				
	8 channels	1,700,000	14,940	94,475	73,585
	12 channels	1,850,000	15,440	101,600	79,235
	16 channels	2,000,000	15,940	108,725	84,885
470V/7A	CPU Complex; includes 32K-byte buffer storage, console with maintenance processor, and power distribution unit; main memory and channels as indicated below.				
	With 4,194,304 bytes of main memory and:				
	8 channels	1,550,000	9,540	64,940	50,595
	12 channels	1,700,000	10,040	72,065	56,245
	16 channels	1,850,000	10,540	79,190	61,895
	With 8,388,608 bytes of main memory and:				
	8 channels	1,700,000	11,440	77,340	60,245
	12 channels	1,850,000	11,940	84,465	65,895
	16 channels	2,000,000	12,440	91,590	71,545
	With 12,582,912 bytes of main memory and:				
	8 channels	1,850,000	13,340	89,740	69,895
	12 channels	2,000,000	13,840	96,865	75,545
	16 channels	2,150,000	14,340	103,990	81,195
	With 16,777,216 bytes of main memory and:				
	8 channels	2,000,000	15,240	102,140	79,545
	12 channels	2,150,000	15,740	109,265	85,195
	16 channels	2,300,000	16,240	116,390	90,845
470V/7	CPU Complex; includes 32K-byte buffer storage, console with maintenance processor, and power distribution unit; main memory and channels as indicated below.				
	With 4,194,304 bytes of main memory and:				
	12 channels	1,975,000	10,270	78,405	61,310
	16 channels	2,125,000	10,770	85,530	66,960
	With 8,388,608 bytes of main memory and:				
	12 channels	2,125,000	12,170	90,805	70,960
	16 channels	2,275,000	12,670	97,930	76,610
	With 12,582,912 bytes of main memory and:				
	12 channels	2,275,000	14,070	103,205	80,610
	16 channels	2,425,000	14,570	110,330	86,260
	With 16,777,216 bytes of main memory and:				
	12 channels	2,425,000	15,970	115,605	90,260
	16 channels	2,575,000	16,470	122,730	95,910

*Includes 24-hour/7-day service; applies to both purchased and leased systems.

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		Purchase Price	Monthly Maint.*	2-Year Lease	4-Year Lease
PROCESSORS AND MAIN MEMORY (Continued)					
470V/8	CPU Complex; includes 64K-byte buffer storage console with maintenance processor, and power distribution unit; main memory and channels as indicated below.				
	With 4,194,304 bytes of main memory and:				
	12 channels	2,175,000	10,750	81,935	66,450
	16 channels	2,325,000	11,250	92,060	72,100
	With 8,388,608 bytes of main memory and:				
	12 channels	2,325,000	12,650	97,335	76,100
	16 channels	2,475,000	13,150	104,460	81,750
	With 12,582,912 bytes of main memory and:				
	12 channels	2,475,000	14,550	109,735	85,750
	16 channels	2,625,000	15,050	116,860	91,400
	With 16,777,216 bytes of main memory and:				
	12 channels	2,625,000	16,450	122,135	95,400
	16 channels	2,775,000	16,950	129,260	101,050
MEMORY					
	4-Megabyte Memory Increment for 470V/7 Series and 470V/8	150,000	2,260	15,500	12,065
	8-Megabyte Memory Increment for 580 Series	200,000	400	7,200	5,750
	Channel to Channel Adapter for 470 processors	32,500	—	1,000	900
	Two-Byte Interface for 470 processors	1,400	—	50	40
	Channel to Channel Adapter for 580 processors	15,000	—	625	500
	Field Upgrade 470V/7C to 470V/7B	250,000	1,590	3,550	2,900
	470V/7B to 470V/7A	350,000	300	6,400	5,125
	470V/7A to 470V/7	325,000	230	7,800	6,500
	470V/7 to 470V/8	250,000	480	7,200	5,775
	Four Channel Group for all 470 systems	175,000	500	8,400	6,775
	Hardware Monitor Interface for 470V/7C through 470V/8	40,000	150	1,865	1,400
	Eight Channel Group for 580 systems	175,000	200	5,950	4,750
	Additional 470 Series Channels; requires minimum 16 channels with CPU complex:				
	24 channels	425,000	2,260	20,615	16,040
	28 channels	575,000	2,760	27,740	21,690
	32 channels	725,000	3,260	34,865	27,340

*Includes 24-hour/7-day service; applies to both purchased and leased systems.

		Purchase Price	Monthly Maint. Cost for Purchase	2-Year Lease	4-Year Lease	Monthly 24-hour, 7-day Maint.
4705 COMMUNICATIONS PROCESSOR						
4705-5	Processor with 64K bytes of memory, up to 64 lines	$38,000	$276	$850	$760	$384
4705-6	Processor with 64K bytes of memory, up to 160 lines	49,300	297	1,165	1,040	412
4705-7	Processor with 64K bytes of memory, up to 256 lines	60,600	318	1,480	1,325	442
4705-8	Processor with 64K bytes of memory, up to 352 lines	71,900	339	1,830	1,600	471
MEMORY						
Additional 64K bytes		2,650	52	145	125	72
Additional 128K bytes		5,300	104	290	250	145

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SOFTWARE PRICES

	Field Installation Charge	Factory Installation Charge	Comments
470/Accelerator Hardware for 470V/7C, 470V/7B, 470V/7A	1,500	1,000	for first month plus $90 for each additional metered hour thereafter
470/Extended Performance Accelerator Hardware for 470V/7B only	3,000	2,500	for first month plus $300 for each additional metered hour thereafter

	Monthly Program Support Charge	Monthly Additional Program Support Charge
Local Programming Support for 580 Series		
VM	$975	$585
MVS	1,450	835