BASF 7/7X Series

MANAGEMENT SUMMARY

UPDATE: *The BASF 7/7X Series has not undergone any recent restructuring, such as deletions or additions of new models. MIPS rates and maximum storage capacities, however, have been increased on all the models. The maximum number of BLYMUXs on all the models has been reduced from 6 to 5. The minimum number of BLMUXs has been increased on all the models from 6 to 8. In addition, VM/HPO and VM/XA operating systems can now be supported by all the models. Peripherals now available for use with the 7/7X Series include the 6085/6485/6486 disk subsystem, 6085-S/6580/6581 high-speed storage system, 6890 laser printer, and 6044 C/D and 6044 K/L optical channel extension units. Purchase prices have been reduced throughout the series.*

The BASF 7/7X Series was introduced in 1982 and has been expanded so that it currently contains the following five single processor models: 7/71, 7/72, 7/73, 7/75, and 7/78. The two most recent models, introduced in the spring of 1984, are the 7/71 and 7/72 which brought less expensive entry-level systems into the series. The 7/78 is also available in a dual-processor version termed the 7/78 MP. The complete range is field-upgradable.

BASF reported a very successful year in 1985 with increased worldwide sales up 24 percent to DM 1.5 billion. Three-quarters of company sales occurred in Europe and one-quarter, overseas. BASF has installed approximately 400 mainframe computers and over 23,000 peripherals worldwide. Its business strategy for 1986 calls for additional expansion of the plug-compatible mainframe business and the establishment of a production facility for the BASF 4800 chromium dioxide computer tape cassette. Expenditures for research and development, as well as for additional personnel, are expected to increase by approximately 20 percent. ▷
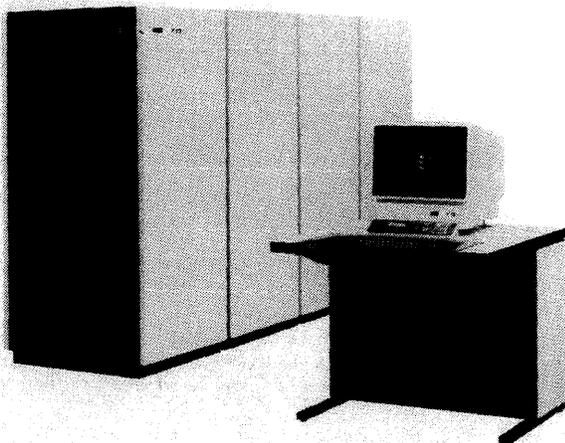
The BASF 7/73 is equivalent to the IBM 3083 E.

The five models within the BASF 7/7X Series are based on the Hitachi M260H processor and are fully hardware- and software-compatible with comparable IBM systems. One model, the 7/78 MP, is a dual-processor version.

MODELS: BASF 7/71, 7/72, 7/73, 7/75, 7/78, 7/78 MP.
CONFIGURATION: 1 (2 in the case of the 7/78MP) CPU, from 16MB to 32MB main memory, and 1 to 3 input/output processors.
COMPETITION: IBM 308X Series.
PRICE: Purchase prices range from approximately DM 1.500.000 for a basic 7/71, to DM 3.000.000 for a 7/78 configuration.

CHARACTERISTICS

VENDOR: BASF AG, D6700 Ludwigshafen, West Germany. Telephone (0621) 601. Telex 464738 basf.

COMPANY LOCATIONS: *Argentina*: BASF Argentina SA, Av. Corrientes 327, 1000 Buenos Aires. Telephone (01) 312 949196; *Austria*: BASF Osterreich GmbH, Heitzinger Hauptstr. 119, A-1131 Vienna. Telephone (0222) 82 94310; *Belgium*: BASF Chimi SA, Avenue Hamoir-Iaan 14, B-1180 Brussels. Telephone (02) 375 2400; *Brazil*: BASF Brasileira SA, Industrias Quimicas, Avenida Sao Luiz 86, 01046 São Paulo Sp. Telephone (011) 257 0011; *Finland*: O.Y. Mercantile AB, Viljatie 2, SF-00701 Helsinki. Telephone (0) 354122; *France*: Compagnie Française BASF SA, 140 rue Jules Guesde, 92303 Levallois. Telephone (01) 730 5500; *Netherlands*: BASF Nederland b.v., Kadestraat 1, 6811 Arnhem. Telephone (085) 717171; *Spain*: BASF Espanola SA, Paseo de Gracia 99, E-08008 Barcelona. Telephone (03) 215 1354; *Sweden*: BASF Svenska AB, Vretenvaegen 10, S-17154 Solna. Telephone (08) 980840; *Switzerland*: BASF (Schweiz) AG, Appital, CH-8820 Wädenswil/Au. Telephone (017) 839111; *United Kingdom*: BASF United Kingdom Ltd., 4/5 Fitzroy Square, London WlP 6ER. Telephone (01) 388 4200.

MANUFACTURER: Hitachi, Japan.

MODELS: BASF 7/71, 7/72, 7/73, 7/75, and 7/78, based on the Hitachi M260H. The 7/78 is also offered as the 7/78 MP, dyadic model.

DATE ANNOUNCED: 7/73, 7/75, 7/78—Autumn 1982.

DATE OF FIRST DELIVERY: 7/73, 7/75, 7/78—December 1982.

NUMBER INSTALLED TO DATE: 221 as of January 1986.

DATA FORMATS

BASIC UNITS: 8-bit byte, 16-bit half-word, 32-bit word. A byte represents one alphanumeric character, 2 BCD digits, or 8 bits.

FIXED-POINT OPERANDS: Operands can range from 1 to 16 bytes (1 to 31 digits plus sign) in decimal mode, and one half-word (16 bits) or one word (32 bits) in binary mode. ▶

BASF 7/7X Series

TABLE 1. BASF 7/7X SERIES CHARACTERISTICS

MODEL	7/71	7/72	7/73	7/75	7/78	7/78 MP
SYSTEM CHARACTERISTICS						
Date of introduction	Spring '84	Spring '84	Autumn '82	Autumn '82	Autumn '82	Spring '84
Date of first delivery	Spring '84	Spring '84	Dec. '82	Dec. '82	Dec. '82	Spring '84
Number of CPUs per system	1	1	1	1	1	2
Performance, MIPS	3.4	4.3	5.5	7.5	9.5	17.0
Principal operating systems	VM/370 or VM/SP or MVS/ SP or MVS/XA, VM/HPO, VM/ XA	VM/370 or VM/SP or MVS/ SP or MVS/XA, VM/HPO, VM/ XA	VM/370 or VM/SP or MVS/ SP or MVS/XA, VM/HPO, VM/ XA	VM/370 or VM/SP or MVS/ SP or MVS/XA, VM/HPO, VM/ XA	VM/370 or VM/SP or MVS/ SP or MVS/XA, VM/HPO, VM/ XA	VM/370 or VM/SP or MVS/ SP or MVS/XA, VM/HPO, VM/ XA
MAIN STORAGE						
Storage type	NMOS	NMOS	NMOS	NMOS	NMOS	NMOS
Read cycle time, nanoseconds	400	400	400	400	400	400
Bytes fetched per cycle	8	8	8	8	8	8
Minimum capacity, MB	16	16	16	16	16	16
Maximum capacity, MB	64	64	64	64	64	128
Increment size, MB	16	16	16	16	16	16
Error correcting memory	Standard	Standard	Standard	Standard	Standard	Standard
CACHE STORAGE						
Capacity, KB	32	32	32	64	256	2 X 256
Cycle time, nanoseconds	13	13	13	13	13	13
I/O CHANNELS AND ADAPTERS						
No. of BYMUXs	0-5	0-5	0-5	0-5	0-5	0-5
No. of BLMUXs	8-24	8-24	8-24	8-24	8-24	8-24
Total maximum no. of channels	24	24	24	24	24	24
Maximum channel data rates						
byte multiplexer, KB/sec.	100	100	100	100	100	100
block multiplexer, MB/sec.	3	3	3	3	3	3
Channel to channel adapter	Optional	Optional	Optional	Optional	Optional	Optional
Other adapters from IBM or PCMs	Can be fitted	Can be fitted	Can be fitted	Can be fitted	Can be fitted	Can be fitted

BYMUX—Byte multiplexer channel.
BLMUX—Block multiplexer channel.

NA—Not available.

▷ The 7/7X Series contains the middle systems within BASF's total range of IBM-compatible machines. The less powerful models form the BASF 7/6X Series, while the top-end models are the 7/8X and 7/9X ranges. All models are based on Hitachi processors.

This series will be most attractive to buyers who are looking for upgrades or replacements for existing IBM 308X machines. Although BASF is a smaller company than IBM, the firm has established a reputation as being able to deliver products that offer price/performance savings over comparable IBM systems. In its role as a plug-compatible mainframe vendor, BASF also produces a strong line of IBM-compatible peripheral products.

Through the years, BASF has developed a strong relationship with Hitachi for the manufacture of its processors. All models in the 7/7X Series are based upon the Hitachi M260H central processor and demonstrate BASF's ongoing working arrangement with Hitachi. The 7/7X Series is fully compatible with the IBM 308X and earlier 3033 Series. BASF's strategy is to offer savings of 50 percent on the corresponding machine price. Performance figures for the 7/7X Series range from 3.4 MIPS (Million Instructions Per Second) to 17.0 MIPS (see Table 2 for comparison to IBM machines).

The standard configuration for all five models includes a central processor, 16M bytes of main memory, an integrat- ▷

▶ FLOATING-POINT OPERANDS: In "short" format, an operand consists of 1 word with a 24-bit fractional part and 7-bit hexadecimal exponent. For extended precision format, 2 words are used, comprising a 56-bit fraction and 7-bit hexadecimal exponent.

INSTRUCTIONS: 2, 4, or 6 bytes in length, specifying 0, 1, or 2 memory addresses, respectively.

INTERNAL CODE: EBCDIC (Extended Binary-Coded Decimal Interchange Code).

MAIN STORAGE

TYPE: 256K-bit NMOS chips.

CYCLE TIME: Access time to main memory is 150 nanoseconds.

CAPACITY: 7/71, 7/72, 7/73, 7/75, 7/78: 16MB to 64MB in one increment of 16MB.

CHECKING: There are 3 mechanisms for error detection. These are:

• Parity checking on all data paths within the central processor and on all the channels.

• A Hamming-code check on all operations in main storage. This check automatically ensures that all single-bit errors are corrected, and that all multiple-bit errors are detected.

• A combined check sum and parity check to detect and correct errors in control storage.

STORAGE PROTECTION: Protection is facilitated by the use of 2K pages or multiples thereof. There is also separate ▶▶

BASF 7/7X Series

▷ ed input/output processor with adapter, 2 byte multiplexer channels, each with a transfer rate of 100K bytes per second, and 6 high-speed block multiplexer channels, each with a transfer rate of 3M bytes per second. Also included in the standard system are a console containing a VDU, keyboard, printer adapter, remote link, and a power and service processor.

All models use advanced chip technology, incorporating 256K-bit main memory chips for which BASF claims high reliability. The service processor comes into operation if a failure occurs, enabling the system to be used in spite of the malfunction. The service processor keeps downtime to a minimum by initiating recovery procedures. Expansion possibilities on all models include main memory increases to 64M bytes, an additional two input/output processors, and a second system console.

The BASF 7/7X machines offer total software compatibility with the following IBM operating systems: MVS/SP, MVS/XA, VM/370, VM/SP, VM/HPO, and VM/XA.

COMPETITIVE POSITION

The BASF 7/7X Series is hardware- and software-compatible with the IBM 308X Series. Specifically, the approximate equivalencies of BASF and IBM machines are as follows: BASF 7/71 with IBM 3083 CX; 7/72 with 3083 EX; the 7/73, 7/75, and 7/78 with the 3083 BX and JX; and the 7/78 MP with the dual-processor IBM 3081 KX.

Other PCM products competing against the IBM 308X Series include National Advanced Systems AS/8000 and AS/9000 models, and the Amdahl 580 Series.

ADVANTAGES AND RESTRICTIONS

Plug-compatible products offer the advantages of lower price/performance ratios over their IBM counterparts. Potential buyers, however, have to ask themselves if the purchase of plug-compatible machines will offer them short-term gains, but long-term losses if the software and peripherals for their equipment don't satisfy their needs. In the case of the BASF 7/7X Series, those fears are unfounded. The 7/7X Series can support a broad range of operating systems and can be fitted with peripherals of the highest quality.

BASF has been a leader in supplying excellent peripheral equipment. Responses from users in Datapro's surveys in Germany and Britain attest to their value. German users rated the reliability of BASF peripherals as 3.43, and British users rated them as 3.17.

The reliability of BASF mainframes, a factor stressed by BASF, has also been supported by Datapro surveys. In our most recent British survey, users gave a perfect rating of 4.00 for *reliability of mainframe*; the German users also rated mainframe reliability extremely high with a 3.86.

Although the 7/7X Series has been on the market since 1982, BASF has not neglected this line in favor of its newer ▷

▶ protection for the lowest address space in memory. These features prevent unauthorized access to programs and data.

CENTRAL PROCESSOR

The MIPS (Million Instructions Per Second) ratings for the BASF 7/7X systems are as follows: 7/71—3.4; 7/72—4.3; 7/73—5.5; 7/75—7.5; 7/78—9.5; 7/78 MP—17.0. Central processor cycle times are 40 nanoseconds for the /71, /72, /73, /75, and 35 nanseconds for the 7/78.

The functions of the central processor are:

• Executing central and I/O instructions

• Controlling and monitoring channel operations and main storage access

• Communicating with the service processor when required

• Facilitating access by the service processor if there is a hardware malfunction

SERVICE PROCESSOR: The service processor is integrated into the CPU and has the following functions:

• Continuous monitoring of all attached environmental sensors (power, cooling, and humidity)

• Monitoring communication between console and CPU

• Error analysis, gathering, and recording data on hardware malfunction, and initiating recovery procedures

• Controlling the execution of diagnostic programs

• Initiating and controlling remote (telephone) system support functions

CONTROL STORAGE: Consists of 252KB, divided into 16K 126-bit words.

CACHE STORAGE: Access time to cache memory, from which most instructions are fetched, is 13 nanoseconds on all models. Capacity is 32KB on the 7/71, 7/72, and 7/73; 64KB on the 7/75; and 256KB on the 7/78.

ADDRESSING: Real, absolute, and logical addressing modes are used. Direct addressing of virtual program segments can take place. There is also a dual-address space facility whereby 2 locations can be addressed simultaneously.

DYNAMIC ADDRESS TRANSLATION: The translation between virtual and real addresses is made via a 2-level table lookup. This process is aided by the provision of a Translation Look-Aside Buffer (TLB) which provides 512 address pairs.

INSTRUCTION REPERTOIRE: The System/370 mode contains 183 instructions, including complete arithmetic facilities for processing variable-length decimal and fixed-point binary operands, as well as instructions which handle loading, storing, comparing, branching, shifting, editing, radix conversion, code translation, logical operations, packing, and unpacking. In addition, a group of "privileged instructions," usable only by the operating system, handles input/output and various hardware control functions.

Also standard are some instructions that were optional on some models of the System/370. These include the dynamic address translation instructions of Load Read Address, Reset Reference Bit, Purge Translation Look-Aside Buffer, Store Then AND System Mask, and Store Then OR System Mask; the VTAM support instructions of Compare and ▶

BASF 7/7X Series

▷ 7/8X and 7/90 Series. Main memory capacities and MIPS functions have been increased throughout the range. The scope of operating systems supported has also been broadened to include VM/HPO and VM/XA.

New peripherals, such as the 3890 laser printing system and 6085/6485/6486 disk subsystems, are now available for the 7/7X Series. BASF has also enhanced communications capabilities by introducing two new optical channel extension units to connect peripherals to remote processors.

USER REACTIONS

Datapro conducts several annual computer user surveys throughout the United States and Europe. The BASF computers were rated by users in both the German and British surveys.

The most recent survey of German computer users brought responses from seven BASF 7/XX systems users, who rated ▷

▶ Swap, and Compare Double and Swap; the extended precision floating-point instructions; and Multiply/Add.

INTERRUPTS: Classes of interrupts include I/O, external, program, supervisor call, machine check, and restart. Classes of interrupts are distinguished by the storage locations in which the old program status word (PSW) is stored and from which the new PSW is fetched.

SYSTEM CONSOLE: The system console consists of a display and separate keyboard with an optional hard copy printer. The 7-color display has a screen diagonal measurement of 14 inches and holds 25 lines of 80 characters, with an extra line for system status. The keyboard has 87 keys including 12 program function keys. All models are equipped with one system console as standard, and a second is optional. The system console can be sited up to 33 meters from the central processor.

CONFIGURATION RULES

The major difference between the five models in the series is in central processor power. Each system comprises a basic ▶

TABLE 2. BASF 7/7X AND IBM 308X SYSTEM COMPARISON

MIPS Rating	System	Bar
(2.7)	3083 CX	▓▓▓▓ (to 2.7)
(3.3)	7/71	▭ (to 3.3)
(3.8)	3083 EX	▓▓▓▓ (to 3.8)
(3.8)	7/72	▭ (to 3.8)
(4.9)	7/73	▭ (to 4.9)
(5.5)	3083 BX	▓▓▓▓ (to 5.5)
(6.6)	7/75	▭ (to 6.6)
(7.5)	3083 JX	▓▓▓▓ (to 7.5)
(8.5)	7/78	▭ (to 8.5)
(10.7)	3081 GX	▓▓▓▓ (to 10.7)
(14.0)	3081 KX	▓▓▓▓ (to 14.0)
(15.5)	7/78 MB	▭ (to 15.5)

MIPS Rating scale: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
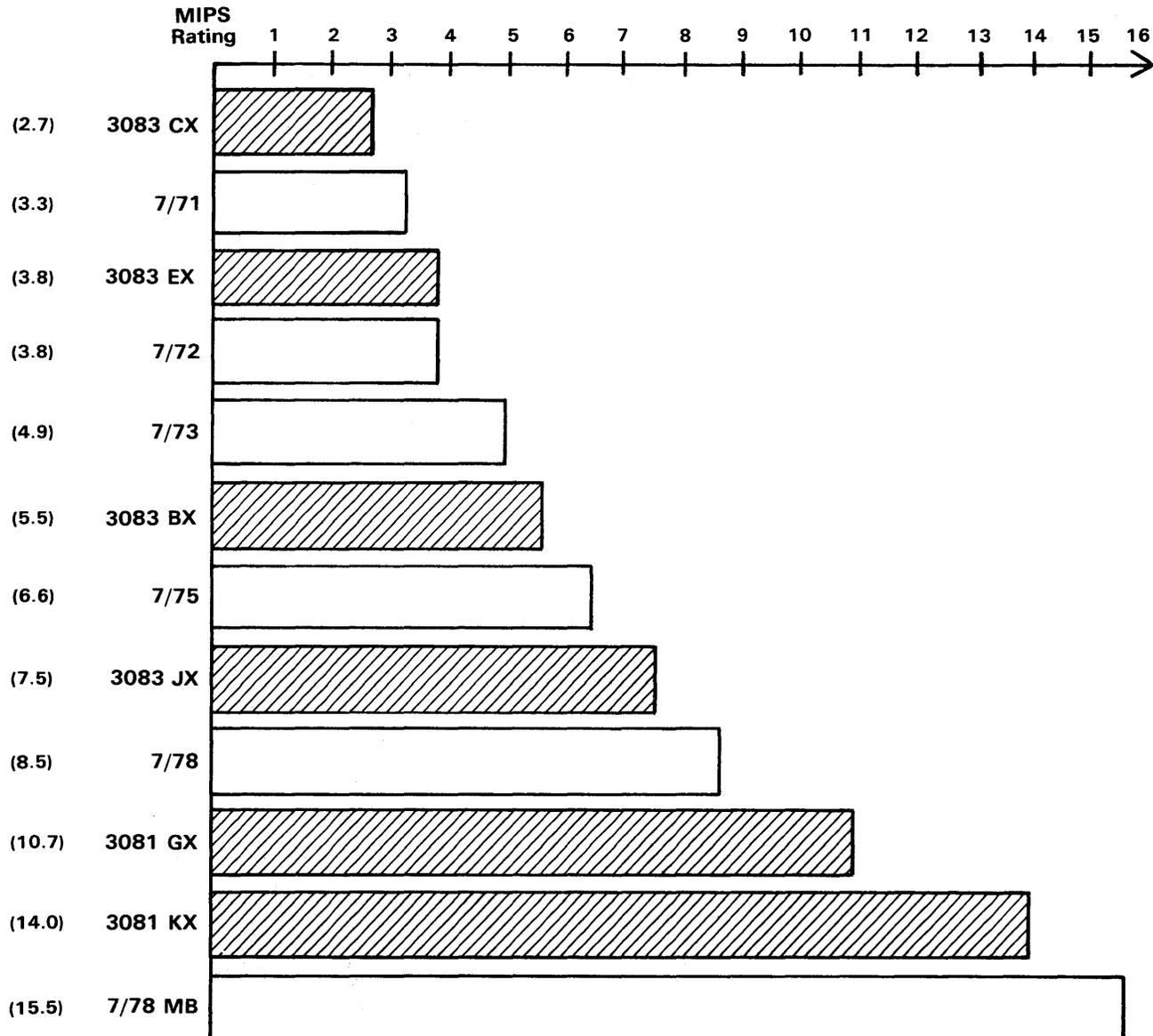
BASF 7/7X Series

▷ BASF 7/6X, 7/7X, and 7/8X machines. The responses are shown in the tables below. Major application areas included accounting/billing, order processing/inventory control, payroll/personnel, manufacturing, sales distribution, and purchasing, and the average life of the systems was approximately 33 months.

Six users reported having a database management system installed; all seven ran a communications monitor, and two systems supported integrated word processing functions.

In discussing future enhancements, all seven users said they intended to expand their data communications facilities within the next 12 months. Six users also said they hoped to expand their hardware, and six intended to acquire proprietary software from suppliers other than BASF.

The seven users were obviously well satisfied with the BASF machines, since they all replied "Yes" to both of the following questions: "Did the system do what you expected it to do?" and "Would you recommend the system to another user?"

The ratings were based on equating user responses as 4.0 for Excellent, 3.0 for Good, 2.0 for Fair, and 1.0 for Poor.

The first table lists the overall systems ratings:

German Survey:

Ease of operation	3.29
Reliability of mainframe	3.86
Reliability of peripherals	3.43
Maintenance service:	
Responsiveness	3.43
Effectiveness	3.57
Technical support:	
Troubleshooting	3.00
Education	3.00
Documentation	3.00
Manufacturer's software:	
Operating system	2.71
Compilers & assemblers	2.71
Applications programs	2.40
Ease of programming	2.33
Ease of conversion	2.40
Overall satisfaction	2.67

Weighted averages on a scale of 4.0 for Excellent.

Users also gave the following additional ratings:

Ease of conversion/reconfiguration	3.00
Compatibility of terminals and peripherals	3.29
Compatibility of programs/data from other systems	3.43
Power/energy efficiency	3.43
Productivity aids keep program costs down	2.20
Software and support promised by vendor	2.20
Timely delivery/installation of equipment	3.00
Timely delivery of required software	3.00
Keeping up with and implementing vendor changes to hardware/software	3.33

Weighted averages on a scale of 4.0 for Excellent. ▷

▷ 16MB of main memory, expandable to 64MB; cache memory, from 1 to 3 input/output processors; and 1 system console. Cache memory consists of 32KB on the 7/71, 7/72, and 7/73; 64KB on the 7/75; and 256KB on the 7/78 (see Table 1 for full specifications).

Options for all models include a second system console and a console printer, as well as the following:

- The direct control feature which interfaces directly with another compatible central processor or peripheral to enable data exchange to take place with minimum delay

- High-speed arithmetic (HSA) which accelerates execution of floating-point and fixed-point arithmetic instructions with a performance improvement of up to 15 percent

- A channel-to-channel adapter which facilitates the exchange of data between CPUs via byte or block multiplexer channels

An optional feature which is available only on the 7/78 is the Multiprocessor (MP). A coupled processor, the MP uses the same operating system and main memory as the basic processor, but has its own I/O channels. The MP option offers additional channel groups to increase channel throughput and load balancing, and BASF states that the 7/78 MP has a MIPS rating of 15.5.

INPUT/OUTPUT CONTROL: All models include in their standard configurations one I/O Processor (IOP) and can optionally support two additional IOPs. Each IOP has a maximum of 8 channels, including up to 2 byte multiplexer channels (BYMUXs) and between 6 and 8 block multiplexer channels (BLMUXs). The total number of channels per central processor can be 24.

The data rate on a BYMUX is 100KB per second and 3MB per second on a BLMUX. A datastreaming facility is standard on all BLMUXs. The total channel throughput per central processor is 55.9M bps on the 7/71, 7/72, 7/73, and 7/75, and 60M bps on the 7/78.

Each BYMUX and BLMUX has 256 subchannels which can be, in effect, a specific device. Any IBM or IBM-compatible peripherals can be used, including the wide range of BASF peripherals.

MASS STORAGE

All IBM mass storage devices for the 360, 370, 4300, and 308X Series can be fitted to the BASF 7/7X Series. Compatible peripherals from PCMs, including BASF, can be used. The BASF disk drives are outlined below.

BASF 6470/6472: Compatible with the IBM 3370, the 6470 and 6472 units can be attached to BASF 7/7X and 7/6X Series, and IBM 4341, 4361, and 4381 systems using the IBM 3880 Model 1, 2, or 4. Connection to the IBM 4331 and 4361 is also possible through the DASD adapter. The disk unit has 1 spindle with a capacity of 570MB. The average access time is 20 ms, and the transfer rate is 1859K bps. The two units are specifically compatible with the IBM 3370 A01 (BASF 6470) and IBM 3370 B01 (BASF 6472).

BASF 6470-2/7472-2/6473-2: Compatible with IBM 3370-2. Connection to BASF and IBM systems is effected as it is for BASF 6470/6472. The disk unit has one spindle with a capacity of 730MB. The average access time is 19 ms, and the transfer rate is 1859KB per second. The units are specifically compatible with IBM 3370 A02 (BASF 6470-2) and IBM 3370 B02 (BASF 6472-2). The BASF 6473-2 has no IBM equivalent and offers, as the last unit in a string, increased performance by using the "Cross Call" feature. ▷

BASF 7/7X Series

▷ The BASF 7/6X and 7/7X models were also rated by seven users in Datapro's most recent British User Survey. The average system life of these machines was 29 months, and the major applications areas included accounting, order processing/inventory control, purchasing, education, sales/distribution, and decision support.

The seven British users were also obviously satisfied with their BASF machines. They, too, all replied affirmatively to the question, "Did the system do what you expected it to do?," and gave an outstanding rating of 4.00 for reliability of mainframe. The British users also rated maintenance responsiveness and maintenance effectiveness highly. The British system ratings are summarized in the following table:

British Survey:

Ease of operation	3.17
Reliability of mainframe	4.00
Reliability of peripherals	3.17
Maintenance service:	
Responsiveness	3.67
Effectiveness	3.67
Technical support:	
Troubleshooting	3.00
Education	2.33
Documentation	2.50
Manufacturer's software:	
Operating system	3.00
Compilers & assemblers	2.80
Applications programs	2.40
Ease of programming	2.40
Ease of conversion	2.20
Overall satisfaction	2.80

Weighted averages on a scale of 4 for Excellent, 3 for Good, 2 for Fair, and 1 for Poor.

Users also gave the following additional ratings:

Ease of expansion	3.67
Compatibility of terminals and peripherals	3.50
Compatibility of programs/data from other systems	3.17
Power/energy efficiency	3.00
Productivity aids	2.67
Software and support promised by vendor	2.83
Ease of application development	2.67
Timely delivery/installation of equipment	3.17
Timely delivery of required software	2.83
Keeping up with and implementing vendor changes to hardware/software □	3.17

▶ **BASF 6475/6476/6477:** Compatible with the IBM 3375, the units can be attached to BASF 7/7X and 7/6X Series, and IBM 4341, 4361, and 4381 systems using the BASF 6085-1 or IBM 3880 Model 1, 2, or 4 disk controllers. The disk unit has one spindle with a capacity of 820MB. The average access time is 19 ms, and the transfer rate is 1859K bps. The units are specifically compatible with IBM 3375 A01 (6475), IBM 3375 B01 (6476), and IBM 3375 D01 (6477).

BASF 6480/6481: Compatible with the IBM 3380, this unit attaches to BASF 7/6X, 7/7X, and 7/8X, and IBM 4341, 4361, 4381, 303X, or 308X systems via the BASF 6085-7 control unit. The 6480/6481 has two drives per unit, each with a capacity of 1260MB. Average access time is 25 ms. The transfer rate is 3MB per second.

BASF 6485/6486: Compatible with the IBM 3380-E, the 6485 offers a capacity of 5 gigabytes. A maximum of 20 gigabytes can be attained per string. Like the 3380-E models, the BASF 6485 systems have data transmission rates of 3 megabytes per second, as well as average access times of 17 milliseconds. The BASF 6085 control unit can support 2.5-gigabyte and 5-gigabyte disk units. The use of the buffered control unit, BASF 6085-23, which is equivalent to the IBM 3880-23, increases data throughput rate when frequently needed data are written in the memory with a maximum of 64KB.

Optimized for use with large databases, these units offer the cross-call feature as standard to improve throughput in 370 and XA environments to achieve savings of up to 20 percent in access times. One string of BASF 648X disk drives consists of one BASF 6485 (5GB) or BASF 6480 (2.5GB) head of string and a maximum of three additional BASF 6486 (5GB) or 6481 (2.5GB) disk drives. The full strings yield a total capacity of 20.16GB (6485/6486) or 10.08GB (6480/6481).

In order to connect 648X disk drives to central processors using 3 MB per second datastreaming channels running under VM, VSE, or MVS, the BASF 6085-7 or 6085-23 disk control unit must be used. Both these units have been constructed with VLSI technology. They can be configured with 2-, 4-, and 8-channel switches. They are fitted with their own service processors to monitor the operation and to provide the facilities necessary for maintenance.

The 6085-23 control unit has an 8MB cache buffer that can be expanded to a maximum capacity of 64MB and can be accessed by both storage directors. The most frequently used data records are kept available in the buffer storage, and the delays caused by the disk's mechanical access movements are masked from the CPU.

BASF 6580/6581 HIGH-SPEED STORAGE SYSTEM: The 6580 is intended primarily for computing centers with central processors of the top performance range. It offers considerably faster input/output operations than magnetic disk systems. In the storage hierarchy, this system is situated between the main memory of the central processor and the magnetic disk periphery. It can store time-critical data which must be consulted frequently. Each string can support a maximum storage capacity of 2 gigabytes.

Implementing the 6580 does not require alterations to existing software. The 6580 can run under the same XA and /370 operating systems as the current multidrive disk storage systems. When the system is switched on, it writes data from the integrated Winchester disk into the memory. When the system is switched off, this process occurs in reverse. The additional battery unit of the BASF 6581 prevents accidental destruction of data. The maximum 2-gigabyte configuration of the 6580 is approximately 1.80 meters high and requires a floor space of 80 cm by 455 cm.

INPUT/OUTPUT UNITS

Most IBM System/360 and /370, and 4300 and 308X Series peripherals can be connected to the BASF 7/7X Series, as can peripherals from PCMs including BASF. The BASF units are detailed below.

BASF 6060/636X COMPACT MAGNETIC TAPE SUBSYSTEM: The 6060 is the controller and the 636X, the ▶

BASF 7/7X Series

magnetic tape drive. The drive is compatible with IBM's 3420 Models 4 and 6. The 6060 control unit can have switching capabilities to enable it to access up to 16 tape drives; for the unit to be linked to 2 channels automatic threading is standard. The 636X tape drive is either the 6364 or the 6366 unit. The recording density in each case is either 6250 bpi in Group Coded Recording (GCR) or 1600 bpi in PE. Data transfer rates are 500K bps for the 6364 at 6250 bpi and 128K bps at 1600 bpi; and 780K bps for the 6366 at 6250 bpi and 200K bps at 1600 bpi.

BASF 6050/6358 MAGNETIC TAPE SUBSYSTEM: The 6050 is the controller and the 6358, the magnetic tape drive. The drive is compatible with IBM's 3420-8. The recording density is either 6250 bpi in GCR or 1600 bpi in PE. Data transfer rates are 1250K bps at 6250 bpi and 320K bps at 1600 bpi.

Other peripherals offered by BASF for the 7/7X Series include 2 line printers.

BASF 6603 LINE PRINTER: Equipped with its own integrated controller, this printer is compatible with the IBM 3203-5 and operates at 1,250 lpm with a 48-character set. The unit uses a print band which is mounted as a separate device to facilitate changing. Among the advantages of this printer are microprogrammed self-diagnostics; microprocessor management of the printing process, paper feed, ribbon feed buffer, and transfer of data between channel and printer; and paper feed under program control. Paper particles and dust are removed continuously during printing by a vacuum system. Through the use of an OCR print band, the printout is OCR readable.

BASF 6606 LINE PRINTER: Compatible with the IBM 3203-5, it prints 2,000 lines per minute using a 48-character set, 1,640 lpm with a 64-character set, 1,200 lpm with a 96-character set, and 950 lpm with a 128-character set. Its features are the same as those of the 6603, including OCR capability. The 6606 uses the same print bands and print ribbons as the 6603.

BASF 6890 PRINTING SUBSYSTEM: A laser system, the 6890 has a printout rate of 88 pages (DIN A4) per minute and can be connected to all current BASF and compatible CPUs. To achieve the connection, the same 3203-5 interface is used that is already operational for conventional impact printers. The printer is 1.4 meters high and requires a floor space of 178 cm by 84 cm.

A Winchester disk is a standard feature of the basic version to store form designs and graphic symbols electronically. If the user wishes, the orientation of the printed output can be turned by 90 degrees, depending on the format of the document being printed to achieve considerable increases in document output.

The 3203-5 interface, developed by BASF, was created in cooperation with OEM suppliers. The connection to the 3203-5 interface facilitates the user's migration to laser technology. In addition, software support is provided from the BASF Software Support Group. Training programs are also offered for the operating personnel.

BASF expects the service life of the most sensitive part of a laser system, the drum, to be a least 1.2 million pages. In early practical tests, lifetime cycles of 5 million pages were recorded. The system works with single-part continuous fanfold paper which is tractor-fed. Both the input and the output capacities are 3,000 sheets. The toner is fixed in an environmentally acceptable heat and pressure process. Several character sets are offered in the standard configuration, and others can be added as the user requires.

COMMUNICATIONS CONTROL

Communications adapters from IBM for the 308X Series, and similar devices from PCMs can be fitted to the BASF 7/7X Series.

BASF is now marketing two new models of its optical channel extension for direct connection of peripheral systems to remotely installed processors. The new Model 6044 C/D transmits data over a distance of up to 2 kilometers in DC interlock mode. The data transmission rate is determined by the distance: 76 kilobytes per second are transmitted over 1 kilometer, 43 kilobytes per second are transmitted over 2 kilometers.

Model 6044 K/L extends the channel up to 5 kilometers. In the high-speed mode, it can handle a maximum of 1.4MB per second. In the low-speed mode, the transmission rate of up to 2 kilometers is identical to that of the C/D model. After that, it continues to decrease until it reaches 18 kilobytes per second for the longest possible distance of 5 kilometers.

The channel extensions are connected to BASF and IBM central processors, as well as to other computers with compatible channel interfaces. They are designed for byte multiplexer as well as block multiplexer channels. With the optical channel extension, the user has new possibilities for setting up hardware in an ideal location without modifying it or the software.

SOFTWARE

OPERATING SYSTEMS: The 7/7X machines can run under the following operating systems:

- VM/370

- VM/SP, VM/HPO, VM/XA

- MVS/SP

- MVS/XA

VM/370, VM/SP, and MVS/SP use functions which are either directly microcoded in the BASF systems, or use instructions which are closest to the way in which the machines are microcoded.

All IBM program products as well as compatible programs from other suppliers can be used.

VM/370 (Virtual Machine/370): A system control program, VM/370 manages a machine's resources such as central processor, storage, and I/O devices, so that all are available to many users at the same time. It provides virtual machines with the ability to run multiple operating systems concurrently and with a conversational time-sharing system. VM/370 is designed to run on systems with the Dynamic Translation Feature operating in System/370 mode, and can, therefore, be used on all BASF 7/7X machines.

VM/SP (Virtual Machine/System Product): VM/SP is a program product which extends the capabilities of VM/370. MVS/SP can also run under VM/SP. The overall effect is to increase the operating efficiency of the suboperating systems by as much as 80 percent. It is estimated, however, that VM/SP will use about 15 percent of a system's resources.

VM/SP, VM/HPO: For all available 7/7X machines: PMA (Preferred Machine Assist) to support a MVS guest machine running in a V=R mode. For VM/HPO only: ECPS VM (Extended Control Program Support for VM) which ▶

BASF 7/7X Series

▶ enhances VM's ITR (Internal Throughput Rate) in general. This feature, according to BASF, is not available with IBM's 308X Series machines.

VM/XA: For all 7/7X machines, the SIE function is being microcoded.

MVS/SP (Multiple Virtual Storage/System Product): MVS/SP is IBM's large-scale operating system.

MVS/XA (Multiple Virtual Storage/Extended Architecture): MVS/XA is designed to support the System/370 Extended Architecture. It comprises MVS/SP and the Data Facility Product, which provides data management, device support, program library management, and utility functions.

PRICING: The following prices apply in Germany only, and are not necessarily indicative of prices outside Germany. The prices listed include 16MB main memory and one IOP for each model.

	Purchase Price (DM)
Model 7/71	1.150.000
Model 7/72	1.450.000
Model 7/73	1.750.000
Model 7/75	2.330.000
Model 7/78	3.050.000 ■