

Siemens System 7.800

MANAGEMENT SUMMARY

With its announcement of the first four System 7.800 series models in October 1978, Siemens became the second mainframe vendor to announce that it was going to market IBM-compatible mainframes as well as its own mainframes. But unlike Control Data and the other vendors of IBM-compatible mainframes, Siemens also announced an IBM-compatible operating system and said it would provide customers with both hardware and software support.

Consisting of the 7.870, 7.872, 7.880, and 7.882, the 7.800 range was further expanded in February 1980 with the introduction of a fifth, entry-level model, designated the 7.865.

In anticipation of the IBM 4341-2, 3033S, 3033N, and the 3081, Siemens announced two new 7.800 models in January 1981—the 7.875-2 and 7.881-2—and at the same time, restructured the entire product line of the 7.800 CPU's. The revamped models are now designated the 7.865-2, 7.870-2, 7.872-2, 7.880-2, and 7.882-2, the Version 2 designation reflecting larger memories and price changes for memory and maintenance charges. All 7.800 models are now based on 64K-bit main memory chips. The target area for the Version 2 models ranges from the IBM 4341-2 to the IBM 3081, but only with MVS/OS/VM operating systems. Siemens is following its traditional marketing objective of offering more power at a better price than comparable IBM products, at delivery times no longer than six to nine months.

The seven models in the large-scale 7.800 range are manufactured by Fujitsu and bear a kissing-cousin relationship to the Amdahl systems. Fujitsu is a major stockholder in and subcontractor to Amdahl. In Japan, Fujitsu markets the systems as the M-180 ND and M-200 and the operating system as the OS IV/F4. ▶

Designed as compatible upgrades for IBM System 360 and 370 users, the large-scale System 7.800 computers are competitive with the IBM 4341-2 through the 3081 processors. Available in single and dual processor versions, the 7.800 systems run under BS3000, an operating system compatible with IBM's MVS, OS/VS1, and VM/370 operating systems.

CHARACTERISTICS

SUPPLIER: Siemens Aktiengesellschaft, Bereich Datenverarbeitung, Otto-Hahn-Ring 6, Postfach 83 29 40, 8000 Munich 83, West Germany. Telephone (089) 636-1. Telex 528 801.

MANUFACTURER: Fujitsu Ltd., 6-1, Marunouchi 2-chome, Chiyoda-ku, Tokyo, Japan 100. Telephone (03) 216-3211.

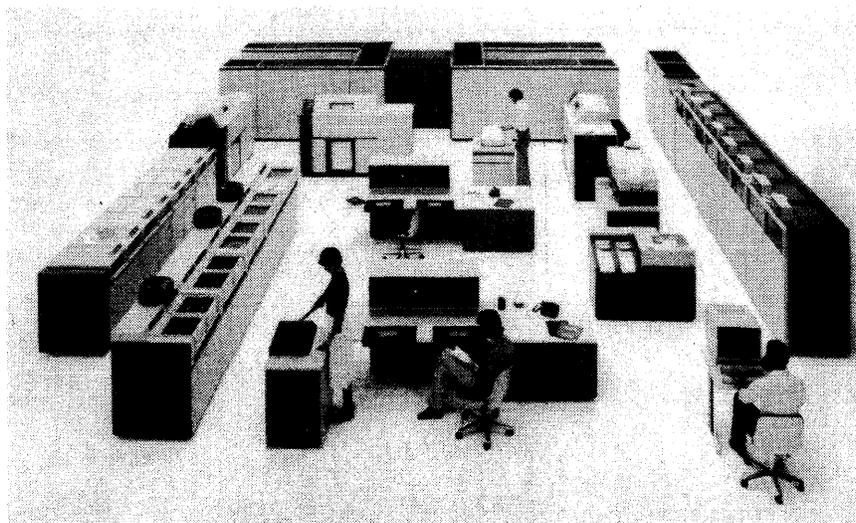
MODELS: Systems 7.865-2, 7.870-2, 7.872-2, 7.875-2, 7.880-2, 7.881-2, 7.882-2.

DATA FORMATS

BASIC UNIT: The 8-bit byte. Each byte can represent 1 alphanumeric character or 2 BCD digits. Two bytes represent a half-word, 4 bytes a word, and 8 bytes of double-word.

FIXED POINT OPERANDS: A half-word can represent a 15-bit signed integer, a word can represent a 31-bit signed integer.

FLOATING POINT OPERANDS: A word is used to represent a signed, short floating point number with a 7-bit characteristic and a 24-bit mantissa. A signed, long floating point number can be represented in a double-word with a 7-bit characteristic and a 56-bit mantissa. For extended floating point representation, two 64-bit double-words are used to provide a 7-bit characteristic and a 112-bit mantissa. ▶



Currently the largest model in the Siemens System 7.800 series, the dual-processor 7.882-2 is designed as a compatible upgrade for large IBM System 360 and System 370 systems.

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CHARACTERISTICS OF THE SIEMENS SYSTEM 7.800 SERIES

MODEL	7.865-2	7.870-2	7.872-2
SYSTEM CHARACTERISTICS			
Date of introduction	January 1981	January 1981	January 1981
Date of first delivery	May 1981	May 1981	May 1981
Number of central processors	1	1	2
Principal operating systems	BS3000/OS/VS1/MVS/VM/370		
Production status	New	New	New
Purchase price, entry system (CPU)	DM 913,000	DM 1,843,700	DM 3,485,600
MAIN STORAGE			
Storage type	MOS	MOS	MOS
Read cycle time, nanoseconds	—	—	—
Write cycle time, nanoseconds	—	—	—
Bytes fetched per cycle	8	8	8
Storage interleaving	4-way	4-way	4-way
Minimum capacity, megabytes	4	4	8
Maximum capacity, megabytes	12	12	16
Increment size, megabytes	4	4	4
Error correcting memory	Standard	Standard	Standard
BUFFER STORAGE			
Cycle time, nanoseconds	70	59	59
Bytes fetched per cycle	32	32	32
Capacity, bytes	8,192	32,768	2 x 32,768
Time to fetch 8 bytes, nanoseconds	—	—	—
RELOADABLE CONTROL STORAGE			
Capacity	8,192 96-bit words per CPU	8,192 96-bit words per CPU	8,192 96-bit words per CPU
PROCESSING UNIT			
Machine cycle time, nanoseconds	70	59	59
Relative performance level (est.)	1.0	1.5	2.5
Instruction prefetching	Standard	Standard	Standard
Processing unit features			
Clock Comparator and CPU Timer	Standard	Standard	Standard
Dynamic Address Translation	Standard	Standard	Standard
Floating-Point	Standard	Standard	Standard
Direct Control	Standard	Standard	Standard
Instruction Retry Hardware	Standard	Standard	Standard
Multiprocessor systems			
Tightly coupled	—	—	Yes
Loosely coupled	—	—	Yes
Attached processor system	No	No	No
Integrated storage control	Optional	Optional	Optional
I/O CONTROL			
Integrated channels, standard	6	6	12
Integrated channels, optional	2	6	12
Selector channels	None	None	None
Data rates, bytes per second			
Byte multiplexer	40K/200K	40K/200K	40K/200K
Block multiplexer	2000K/3000K	2000K/3000K	2000K/3000K
Maximum I/O data rate, bytes/second	12,000K	12,000K	24,000K

➤ Siemens has long recognized IBM's ability to set de facto industry standards, and both Siemens old System 4004 and current System 7.500 and System 7.700 ranges are highly compatible with IBM System/360, System/370, and 4300 ranges. But, as any user who has made a conversion knows, compatibility tends to be black and white. You either have it, or you don't. So now Siemens is offering full compatibility, including BS3000, the functional equivalent of IBM's OS/VS2 (MVS). Version E40 of the BS3000 operating system will be available early this year, supporting all memory sizes within the 7.800 range. In addition, all BS3000-compatible operating systems can be run in System 7.800 environments. This ➤

➤ **INSTRUCTIONS:** System 7.800 processors have a superset of the IBM System/370 instruction set. The additional instructions are hardware-implemented machine instructions that combine the functions of a number of instructions to reduce overhead. Model 7.865-2 has 188 instructions; models 7.870-2 and 7.872-2 have 194 instructions; and models 7.875-2, 7.880-2, 7.881-2 and 7.882-2 have 195 instructions.

INTERNAL CODE: EBCDIC.

MAIN STORAGE

➤ **STORAGE TYPE:** N-MOS semiconductor memory composed of 64K-bit chips is used for all models. ➤

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CHARACTERISTICS OF THE SIEMENS SYSTEM 7.800 SERIES

MODEL	7.875-2	7.880-2	7.881-2	7.882-2
SYSTEM CHARACTERISTICS				
Date of introduction	January 1981	January 1981	January 1981	January 1981
Date of first delivery	June 1981	June 1981	June 1981	June 1981
Number of central processors	1	1	2	2
Principal operating systems	BS3000/OS/VS1/MVS/VM/370			
Production status	New	New	New	New
Purchase price, entry system (CPU)	DM 3,887,800	DM 4,960,000	DM 6,554,000	DM 7,054,000
MAIN STORAGE				
Storage type	MOS	MOS	MOS	MOS
Read cycle time, nanoseconds	—	—	—	—
Write cycle time, nanoseconds	—	—	—	—
Bytes fetched per cycle	8	8	8	8
Storage interleaving	3 x 16 max.	4 x 16 max.	4 x 16 max.	8 x 16 max.
Minimum capacity, megabytes	8	8	8	8
Maximum capacity, megabytes	24	32	32	64
Increment size, megabytes	4/8	4/8	4/8	4/8/16
Error correcting memory	Standard	Standard	Standard	Standard
BUFFER STORAGE				
Cycle time, nanoseconds	26	26	26	26
Bytes fetched per cycle	32	32	32	32
Capacity, bytes	32,768	64	2 x 64	2 x 64
Time to fetch 8 bytes, nanoseconds	—	—	—	—
RELOADABLE CONTROL STORAGE				
Capacity	8,192 96-bit words per CPU			
PROCESSING UNIT				
Machine cycle time, nanoseconds	26	26	26	26
Relative performance level (est.)	2.3	3.3	5.4	5.4
Instruction prefetching	Standard	Standard	Standard	Standard
Processing unit features				
Clock Comparator and CPU Timer	Standard	Standard	Standard	Standard
Dynamic Address Translation	Standard	Standard	Standard	Standard
Floating-Point	Standard	Standard	Standard	Standard
Direct Control	Standard	Standard	Standard	Standard
Instruction Retry Hardware	Standard	Standard	Standard	Standard
Multiprocessor systems				
Tightly coupled	—	No	Yes	Yes
Loosely coupled	—	—	Yes	Yes
Attached processor system	No	No	No	No
Integrated storage control	No	No	No	No
I/O CONTROL				
Integrated channels, standard	8	12	24	24
Integrated channels, optional	8	4	8	8
Selector channels	None	None	None	None
Data rates, bytes per second				
Byte multiplexer	110K/1600K	110K/1600K	110K/1600K	110K/1600K
Block multiplexer	2000K/3000K	2000K/3000K	2000K/3000K	2000K/3000K
Maximum I/O data rate, bytes/second	18,000K	18,000K	36,000K	36,000K

▷ includes IBM operating systems VM/370, OS/VS1, MVS, MVS-SE, and MVS-SP.

According to Siemens, the entry-level 7.865-2 is designed to compete against the IBM 4341-2. With a MIPS (millions of instructions per second) rate of 1.9, the 7.865-2 performance level is approximately 1.35 times more powerful than its IBM rival. Memory can be expanded from 4 to 12 million bytes in 4-million-byte increments.

The Model 7.870-2 is approximately 1.5 times more powerful than the 7.865-2. Based on a MIPS rate of 2.9, the 7.870-2 is approximately 1.2 times more powerful than the IBM 3033S. ▷

▶ **CAPACITY:** See Characteristics Table.

CYCLE TIME: See Characteristics Table.

CHECKING: Error detection and single-bit-error correction are standard on all models. If an error is detected and corrected during a data transfer from main memory to the buffer memory, the corrected data is then automatically written back to main memory to eliminate the error.

STORAGE PROTECTION: Each 2K block of memory has a 7-bit key that includes a 4-bit access code, a reference bit, an alteration bit, and a write-protection bit.

CENTRAL PROCESSORS

There are currently two CPU models in the 7.800 series, each of which can be ordered in a single or dual processor ▶

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▷ The Model 7.872-2 is a dual-processor version of the 7.870-2 providing 1.65 times more power. Memory is expandable from 8 to 16 million bytes in 4 million byte increments.

The Model 7.875-2 offers 1.1 times the performance of the IBM 3033N, and is 20 percent lower in price. Memory can be expanded from 8 to 24 million bytes in 4 or 8 million byte increments.

The Model 7.880-2 is listed by Siemens as 1.3 times more powerful than the 3033U, based on the MIPS rate. Memory can be extended from 8 to 32 million bytes in increments of 4 or 8 million bytes.

The biprocessor Model 7.881-2 is designed to compete against the IBM 3081. With memory ranging from 8 to 32 million bytes, and performance rated at 10.2 MIPS, the 7.881-2 is priced approximately 25 percent lower than its IBM rival. Users have at their disposal between 24 and 32 channels, 8 of which can be used as multiplexor channels operating in data stream mode. In architecture and performance, the 7.881-2 is similar to the 7.882-2; however, it lacks a second Memory Central Unit (MCU) as well as a second service processor.

The Model 7.882-2 is a dual-processor version of the 7.880-2 providing 1.65 times more power. Memory ranges from 8 to 64 million bytes per processor, upgradable in 4, 8, or 16 million byte increments.

An important feature of the seven CPU's in the 7.800 spectrum is the upgrade path within two divergent product categories. One may upgrade the entry-level Model 7.865-2 to the status of the 7.872-2 by first bringing it up to the intermediate power level of the Model 7.870-2. Likewise, a Model 7.875-2 can be upgraded to a 7.880-2 and eventually attain the performance and power of models 7.881-2 or 7.882-2. In the first upgrade path, a performance increase of 2.5 is gained; in the second case a 2.4 fold increase is realized.

Not all of the Siemens software is compatible with the IBM software, and users of IBM's IMS would have to decide whether to stay with the IBM software or convert to Siemens' Advanced Information Management (AIM) system. The trade-off is IBM compatibility versus what Siemens considers better software. AIM follows the Codasyl specifications for data base management.

The good news, of course, is that a user could bring in a System 7.800 and run it under the IBM system software for a limited time. Conversions to Siemens software could be scheduled at the user's convenience.

Siemens is proud of the advanced technology of the System 7.800, but the vendor is basically selling three benefits: compatibility, a better price/performance ratio, and early delivery. ▷

► configuration. Both models have a separate channel processor and a separate service processor. In addition, the smaller model has 8K 96-bit words of reloadable control storage and, optionally, an integrated disk controller. The larger model cycles more than twice as fast, has four times as much cache memory, and twice as many standard channels.

REGISTERS: Both models have 16 general purpose, 32-bit registers; 16 32-bit control registers; and 4 64-bit floating point registers.

INSTRUCTION REPERTOIRE: The System 7.800 instruction set includes the System/370 Universal Instruction Set plus "macro-instructions" used by the operating system to reduce overhead.

CACHE MEMORY: All System 7.800 models have a buffer memory of 8K, 16K, 32K or 64K bytes. Data is transferred from main memory to the buffer 32 bytes at a time (four blocks of 8 bytes each), and from the buffer to the CPU 4 or 8 bytes at a time.

CONTROL STORAGE: The smaller processors (7.865-2, 7.870-2, and 7.872-2) have 8K 96-bit words of reloadable control storage. The larger processors are hard-wired.

DYNAMIC ADDRESS TRANSLATION: The smaller processors can support 15 virtual memory spaces of 16 megabytes each, and the larger models can support up to 128 virtual memory spaces of 16 megabytes each. Virtual addresses, composed of an 8-bit segment number, a 4-bit page number, and a 12-bit displacement number, are translated by hardware in the Storage Control Unit. To reduce the need to fetch tables from memory, a translation lookaside buffer holds information on the most recently used 256 pages. A segment table origin stack is used to keep track of which virtual space each page belongs.

COMPATIBILITY FEATURES: The 7.800 series are software compatible with the IBM System/370 and 30XX processors running under MVS, VM/370 and OS/VS1.

SIMULTANEITY: The smaller processors execute one instruction and preprocess the next instruction at the same time. The 7.875-2 and larger models have a six-stage pipeline and can execute one instruction while preprocessing up to five more instructions at the same time. When a branch instruction is identified, both the next instruction and the instruction located at the branch address are preprocessed.

Memory on the 7.865-2, 7.870-2, and 7.872-2 is four-way interleaved, and the Storage Control Unit fetches 8 bytes at a time from each memory block, transferring 32 bytes at a time to the cache memory. Interleaving on the larger models depends on installed capacity and can be up to 8 x 16-way interleaving.

INPUT/OUTPUT CONTROL

CONSOLE I/O: Each processor is equipped with a console that includes a color display, a keyboard, and disk drives. The service processor, which is integrated in either the processor or the console, handles operator communications with the system and also runs diagnostic programs. To simplify communications, the operator can use a light pen to select operations from lists displayed by the system.

3806-2 CONSOLE: This desk-sized unit contains a single color display, single operator keyboard, and two floppy disks for loading microcode and diagnostic software. A hardcopy printer is included. One 3806-2 is required for the 7.865-2.

3807-2 CONSOLE: This console has the same characteristics as the 3806-2. One 3807-2 is required for the 7.870-2 and two for the dual-processor 7.872-2. ►

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▷ COMPETITIVE POSITION

Siemens calls the System 7.800 range "the alternative." It could be called the "complete alternative," because Siemens, at this time, is the only vendor to offer both IBM-compatible hardware and software and support for both. (Fujitsu's version of the operating system is not completely compatible with IBM's MVS.) Siemens cautions, however, that while the majority of IBM Program Products will run under BS3000, the degree of compatibility above the user-interface level varies from product to product.

In the CPU-replacement market, the 7.800 series will be competing with the Amdahl 470 Systems and the National Advanced Systems. Potential customers are sites that want to upgrade their CPU's or add additional CPU's. But in the system-conversion market, composed of sites that are considering switching from another vendor to IBM, the System 7.800 offers the only complete alternative.

Deliveries of 7.800 systems began in late 1979. Because of the backlog of orders for the 4341-2 and 303X systems, users may find that the most important advantage of the 7.800 systems is availability. □

▶ **3808-2 CONSOLE:** This desk-sized unit contains two displays, two keyboards, and two floppy disk drives for loading diagnostic software. Normally, one station is used for operation and the other for maintenance activities. One 3808-2 is required for a 7.875-2, 7.880-2, or 7.881-2, and two for the dual-processor 7.882-2. On 7.882-2 systems, either console can access any part of either system.

I/O CONTROL: Peripherals are attached to 7.800 systems via independent Input/Output Processors (IOP's) which support both byte multiplexer and block multiplexer channels and which include their own dynamic address translation hardware for channel commands. The channel interface is designed according to IBM channel interface specifications. A 7.865-2 or 7.870-2 system has one IOP with one byte multiplexer and five block multiplexer channels. Up to six channels and three integrated disk controllers can be added to the 7.870-2. Byte multiplexers have a transfer rate of 40 kilobytes/second (200 kilobytes per second total in burst mode), block multiplexers 2.0 megabytes/second, and the file controller 1198 kilobytes/second. The total transfer rate of the IOP is 12 megabytes/second.

A 7.872-2 system has two IOP's, each accessible to either processor.

A 7.875-2 or 7.880-2 system has one IOP with two byte multiplexer channels and 6 or 10 block multiplexer channels, respectively. More channels can be added up to a total of 16, and the IOP can support 2,048 sub-channels. Byte multiplexers have a transfer rate of 110 kilobytes/second, and block multiplexers 2.0 megabytes/second. The total transfer rate of the IOP is 18 megabytes/second.

A 7.881-2 or 7.882-2 system has two IOP's, each accessible to either processor. All IOP's can be equipped with data streaming channels.

MASS STORAGE

Siemens currently offers three types of IBM-compatible disk drives with the 7.800 systems: removable disk pack drives with a capacity of 200 megabytes per drive and fixed media drives with capacities of 317 or 635 megabytes per drive.

MAGNETIC TAPE UNITS

Siemens currently offers IBM-compatible tape drives with recording densities of 800, 1600, or 6250 bpi.

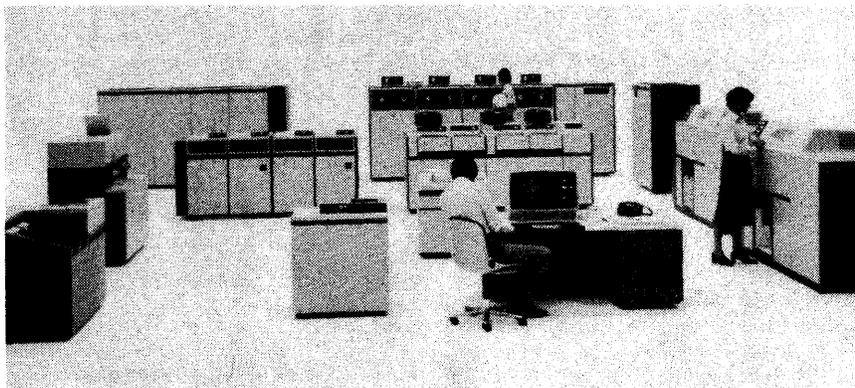
3854 MAGNETIC TAPE DEVICE: This is a 9-track unit that has a recording density of 320 (NRZ) or 640 (PE) bytes per cm (800 or 1600 bpi, respectively), a read/write speed of 160 (NRZ) or 320 (PE) kilobytes per second, a rewind speed of 14.5 meters per second, and a forward tape speed of 5.1 meter per second. The 3854 connects to all models via a 3850-1, -2, -3, or -4 controller.

3857 HIGH DENSITY MAGNETIC TAPE DEVICE: This 9-track unit has a recording density of 640 (PE) or 2460 (GCR) bytes per cm (1600 or 6250 bpi, respectively), a read/write speed of 200 (PE) or 781 (GCR) kilobytes per second, a rewind speed of 12.2 meters per second, and a forward tape speed of 3.18 meters per second. Up to eight magnetic tape devices can be connected to all models via a 3850-1, -2, -3, or -4 controller.

3859 HIGH DENSITY MAGNETIC TAPE DEVICE: This 9-track unit has a recording density of 640 (PE) or 2460 (GCR) bytes per cm (1600 or 6250 bpi, respectively), a read/write speed of 320 (PE) or 1250 (GCR) kilobytes per second, a rewind speed of 16.2 meters per second, and a forward speed of 5.1 meters per second. Up to eight magnetic tape devices can be connected to all models via a 3850-2, -2, -3, or -4 controller.

HIGH SPEED TERMINALS

3833 PRINTER: A chain printer, the 3833 can print at rates up to 3,500 lines/minute when equipped with a 16-character set and 2,000 lines/minute with a 48-character set. Other sets available have 60, 63, and 120 characters, respectively, resulting in maximum printing rates of 1,477 and 1,060 lines/minute, respectively. Lines can be 132 or 136 characters long, ▶



A single-processor system, the 7.865 is the smallest model in the Siemens System 7.800 series of IBM-compatible mainframes. Currently comprised of seven models, the System 7.800 family offers a competitive alternative to the IBM 4341-2 to the 3081 processors.

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► or, optionally, 150 characters long. Printing is 10 characters/ inch at 6 or 8 lines/inch. An optional two-channel adapter allows the printer to be switched between two 7.800 systems. Character chains are packaged in interchangeable cassettes.

PUNCHED CARD UNITS

3815 CARD READER: This unit reads 80-column cards at up to 1,250 cards/minute. The hopper holds 2,000 cards and each of the two stackers holds 1,800 cards. The unit can be optionally equipped to read mark sense cards and cards containing both punches and marks. A two-channel option also is available.

3816 CARD PUNCH: This unit punches 80-column cards at up to 250 cards/minute and has a 2,000-card hopper, two 1,000-card stackers, and a 200-card reject pocket. The unit can be optionally equipped to print up to 25 lines of up to 64 characters each on cards as it punches them. A two-channel option also is available.

TERMINAL SUBSYSTEMS

3880 TERMINAL SYSTEM: This subsystem is composed of a 3884 cluster controller, 3886/7 display terminals, and optionally, 3888 printer terminals.

3884-1 CLUSTER CONTROLLER: Connectable to either a byte or block multiplexer channel at a maximum line length of 100 meters, the 3884-1 cluster controller permits the 3886-2 and 3886-3 data display terminals as well as the 3888-3, 3888-4 (matrix printers) and 3889-1 (line printer) printer terminals to be connected to host 7.800 systems. Maximum data throughput is 350 kilobytes per second. When using the 38804-3 Extension Feature for coaxial cables, up to 12 terminals can be connected in increments of four terminals.

3884-2 CLUSTER CONTROLLER: This controller has the same specifications as the 3884-2, but for FNA (Future Network Architecture) mode.

3884-3 CLUSTER CONTROLLER: The 3884-3 cluster controller permits the 3887-2, 3887-3 data display terminals and the 3888-5, 3888-6, and 3889-2 printer terminals to be connected to the 3891 or 3892 Communications Control Processor. Up to 12 terminals can be hooked up in increments of four terminals into a star-type configuration. The data transfer rates to the communications control processor are 1200 to 7200 bits per second for BSC and 9600 bits per second for HDLC or SDLC via dedicated lines. In the public dial network, the 3884-3 Cluster Controller can be operated under HDLC.

3888 PRINTER TERMINAL: The 3888-3 Printer Terminal is connected as an independent terminal to the 3884-1 or 3884-2 Cluster Controller. Equipped with a 1,920-character buffer, to match the characteristics of the display terminals, the 3888 prints at up to 150 lines/minute. The unit prints at 10 characters/inch, 136 characters to the line, and 6 or 8 lines/inch using a 63-character set.

3888-4 PRINTER TERMINAL: Same specifications as the 3888-3, but possesses a forms attachment for the printing of single documents.

3888-5 PRINTER TERMINAL: Same specifications as the 3888-3, but for connection to the 3884-3 Cluster Controller.

3888-6 PRINTER TERMINAL: Same specifications as the 3888-5, but has facilities for forms attachment.

3889-1/-2 PRINTER TERMINAL: The 3889-1 printer terminal is connected as an independent terminal to the 3884-1 or 3884-2 Cluster Controller. Printing speed is 230 lines per minute, character spacing is 10 characters per inch with 136

characters per line and 6 or 8 lines to the inch. The 3889-1 uses a 96-character set, and has a data buffer of 4,096 bytes.

3889-2 PRINTER TERMINAL: Same specifications as the 3889-1, but connects to the 3884-3 Cluster Controller.

DATA COMMUNICATIONS

3891-2 COMMUNICATION CONTROL PROCESSOR: A programmable subsystem with 128K to 512K bytes of memory, the 3891-2 can support up to 128 asynchronous or synchronous half-duplex lines at speeds up to 9,600 bits/second. The processor uses the IBM 3705-II instruction set and supports IBM BSC communication protocol. Data is transferred to and from the host 7.800 system in burst mode via a channel adapter and either a byte or block multiplexer channel. The 3891-2 has one to four communications scanners, each of which can support up to 32 line sets. Each line set can support up to four lines.

The 3891-2 runs under a Network Control Program (NCP) generated on the 7.800 by selecting macros from a range of functions. The NCP is downline loaded to the 3891-2.

3892-2 COMMUNICATION CONTROL PROCESSOR: This programmable subsystem has from 128K to 1,024K bytes of memory and can support up to 512 asynchronous or synchronous half-duplex lines. All other characteristics are the same as the 3891-2.

SOFTWARE

BS3000 OPERATING SYSTEM: The functional equivalent of and compatible with IBM's OS/VS2 (MVS), BS3000 is a virtual memory control system that supports batch, interactive, and multi-user jobs in a multiprogrammed environment composed of multiple virtual storage spaces. Each job can have up to 16 megabytes of virtual memory, provided that the system has sufficient disk storage space.

Under BS3000, real memory is divided into pages of 2048 bytes each. Virtual memory is divided into consecutive segments of 65,536 bytes, each containing 32 pages. BS3000 combines two pages to form a 4096-byte page. Page tables define the relationship between real and virtual memory at any moment in time. These tables are continuously updated and monitored for pages which are not being used frequently. Based on this, the page management system then allocates real memory to new pages.

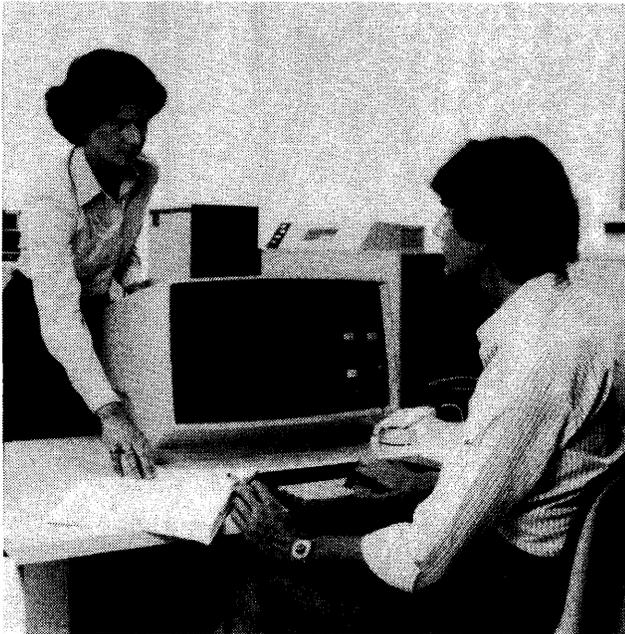
There are two main types of programs under BS3000: privileged and non-privileged routines. The Control System is privileged and consists of the Executive, the Data Management System, the Teleprocessing System, and System Services. Non-privileged routines consist of language processors, utility routines, and user programs.

The Executive performs the following functions:

- Handling console I/O
- Processing user command language
- System accounting, spooling
- Interrupt handling

The Data Management System handles I/O operations except for data terminals and the console(s), including file management and the sharing of files. Access methods supported by the Data Management System include sequential access (QSAM, BSAM), partitioned access (BPAM), direct access (BDAM), Indexed Sequential Access (ISAM), and Virtual Storage Access (VSAM). Access to the data terminals is by the VTAM (Virtual Telecommunications Access Method) for all application programs and subsystems of the host processor. VTAM interacts with a communications control processor (CCP) to which all remote terminals ►

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The 3806-2 and 3807-2 consoles for the 7.865-2 and 7.870-2 models, respectively, include a color display and an integrated cartridge disk drive for loading diagnostic software. Dual-processor 7.872-2 models require two 3807-2 consoles.

► are connected. VTAM also supports locally connected terminals. The communication control processor is controlled by the NCP (Network Control Program) and performs network-oriented communications control.

System Services include an Interactive Debugging Aid, SMART (Siemens Maintenance via Remote Telecommunications), OLTEC (Online Test Control Program for performing diagnostic tests of any I/O control unit), and hardware status reports printed by the SVP (Service Processor) console.

For execution, tasks are classified as either interactive or background (batch). Interactive tasks are initiated via the keyboard of a data terminal. Batch tasks can be assigned any of 9 priorities.

Operating system components (except the Executive), user programs, and application programs are stored in virtual memory and relocated into real memory during execution. Virtual memory space is reallocated to the programs during loading.

Real memory under BS3000 is divided into two sections: one is reserved for the Executive and the real-memory resident

programs, and the other is divided into 4K page frames. All paging is done on demand only.

Virtual memory is subdivided into 6 classes. Classes 1-4 are reserved for the system, while Classes 5 and 6 are available to the user. Class 6 memory is available for user-written programs and begins at the low-order end of the available memory area. Class 5 memory comprises the high-order 64K and is used for tables and buffer areas that have to be set up for user tasks.

Dynamic Address Translation is handled via a special Address Translation Memory (ATM) that holds 128 entries. Each ATM entry contains a Segment and Page reference that is combined with a virtual address displacement to result in a real address. A hit will result in 90-95% of all address references using this multi-level address translation scheme. When an address cannot be determined on the first pass through the ATM, a fall back to Segment/Page tables with an additional 256 entries is required. A maximum of 2-levels are required for 2K-page addressing, and 3-levels are required for 4K-page addressing schemes.

BS3000 includes the Advanced Information Management system (AIM) which supports data management and data communications. AIM comprises a large number of different software functions: data base management, program management, message management, administrator support, service programs, and programming languages. Service Programs include a Linkage Editor and Loader, and a SORT/MERGE program.

LANGUAGES: Ten languages are available on the System 7.800: RPG 2, ALGOL 60, ANS COBOL, FORTRAN IV, PL/1, BASIC, APL, Pascal, LISP and an Assembler. All language compilers are IBM-compatible.

UTILITIES: Siemens offers a full complement of IBM-compatible utilities.

DATA BASE MANAGEMENT SYSTEM: The 7.800 systems use the Advanced Information Management system (AIM) which satisfies the same requirements as IBM's IMS but which follows the Codayl standard.

DATA COMMUNICATIONS SOFTWARE: The 7.800 systems support Future Network Architecture (FNA), the functional equivalent of IBM's SNA.

PRICING

System 7.800 systems are available for purchase and on one-year rental and three and four-year lease plans. Listed below are comprehensive price listings supplied by Siemens at the time this report was written. One should expect an immediate reaction by Siemens to any significant price changes by IBM. ■

EQUIPMENT PRICES

SYSTEM 7.865

	Purchase Price DM	Rental [1] (1-year lease) DM	Rental [1] (3-year lease) DM	Rental [1] (4-year lease) DM	Monthly Maintenance DM
7865 Central Processor, 2048K Bytes of Main Memory	1,222,100	51,030		46,263	9,093
86580-30 Main Memory Extension to 3072K Bytes	148,000	8,704		7,896	550
86580-40 Main Memory Extension to 4096K Bytes	148,000	8,704		7,896	550
86580-50 Main Memory Extension to 5120K Bytes	148,000	8,704		7,896	550
86580-60 Main Memory Extension to 6144K Bytes	148,000	8,704		7,896	550
86550-2 Second Byte Multiplexor Channel	68,980	2,338		2,121	170

[1] Prices include maintenance.
[2] Price not set.

Siemens System 7.800

EQUIPMENT PRICES

		Purchase Price DM	Rental [1] (1-year lease) DM	Rental [1] (3-year lease) DM	Rental [1] (4-year lease) DM	Monthly Maintenance DM
SYSTEM 7.865 (Continued)						
86560-3	Third Byte Multiplexor Channel	68,980	2,338		2,121	170
86560-4	Fourth Byte Multiplexor Channel	68,980	2,338		2,121	170
86560-5	Fifth Byte Multiplexor Channel	68,980	2,338		2,121	170
86560-6	Sixth Byte Multiplexor Channel	68,980	2,338		2,121	170
86560-7	Seventh Byte Multiplexor Channel	68,980	2,338		2,121	170
86567-1	First Integrated Disc Controller	135,150	4,196		3,806	382
86567-2	Second Integrated Disc Controller	135,150	4,196		3,806	382
86567-3	Third Integrated Disc Controller	135,150	4,196		3,806	382
86540	Channel Extension	24,000	510		462	47
SYSTEM 7.865-2						
7865-2	Central Processor, 4096K Bytes of Main Memory	886,130	28,325	23,790		1,975
86585-80	Main Memory Extension to 8,192K Bytes	141,200	4,525	3,800		200
86585-120	Main Memory Extension to 12,288K	141,200	4,525	3,800		200
86550	Additional Byte Multiplexor	12,040	380	320		5
86560	Additional Block Multiplexor	12,040	380	320		5
86567	Integrated Disc Controller	97,800	2,755	2,320		280
SYSTEM 7.870						
7870	Central Processor, 2048K Bytes of Main Memory	2,253,400	80,115		72,660	19,429
87080-30	Main Memory Extension to 3072K Bytes	148,000	8,704		7,896	550
87080-40	Main Memory Extension to 4096K Bytes	148,000	8,704		7,896	550
87080-50	Main Memory Extension to 5120K Bytes	148,000	8,704		7,896	550
87080-60	Main Memory Extension to 6144K Bytes	148,000	8,704		7,896	550
87080-70	Main Memory Extension to 7168K Bytes	148,000	8,704		7,896	550
87080-80	Main Memory Extension to 8192K Bytes	148,000	8,704		7,896	550
87050-2	Second Byte Multiplexor Channel	102,303	3,165		2,871	245
87050-3	Third Byte Multiplexor Channel	102,303	3,165		2,871	245
87060-3	Third Block Multiplexor Channel	123,772	3,829		3,473	297
87060-4	Fourth Block Multiplexor Channel	123,772	3,829		3,473	297
87060-5	Fifth Block Multiplexor Channel	123,772	3,829		3,473	297
87060-6	Sixth Block Multiplexor Channel	123,772	3,829		3,473	297
87060-7	Seventh Block Multiplexor Channel	123,772	3,829		3,473	297
87060-8	Eighth Block Multiplexor Channel	123,772	3,829		3,473	297
87060-9	Ninth Block Multiplexor Channel	123,772	3,829		3,473	297
87060-10	Tenth Block Multiplexor Channel	123,772	3,829		3,473	297
87065-1	First Integrated Disc Controller	157,770	3,819		3,465	437
87065-2	Second Integrated Disc Controller	157,770	3,819		3,465	437
87065-3	Third Integrated Disc Controller	157,770	3,819		3,465	437
87065-4	Fourth Integrated Disc Controller	157,770	3,819		3,465	437
87066-1	Extension of First Integrated Disc Controller	42,560	1,041		945	41
87066-2	Extension of Second Integrated Disc Controller	42,560	1,041		945	41
87066-3	Extension of Third Integrated Disc Controller	42,560	1,041		945	41
87066-4	Extension of Fourth Integrated Disc Controller	42,560	1,041		945	—
87067-1	First Integrated Disc Controller	189,945	5,687		5,158	508
87067-2	Second Integrated Disc Controller	189,945	5,687		5,158	508
87067-3	Third Integrated Disc Controller	189,945	5,687		5,158	508
87067-4	Fourth Integrated Disc Controller	189,945	5,687		5,158	508
87072	Multiprocessor Control	394,120	12,635		11,460	651
87040	Channel Extension	[2]	—		—	—
SYSTEM 7.870-2						
7870-2	Central Processor, 4,096K Bytes of Main Memory	1,816,830	95,920	80,570		9,570
87085-80	Main Memory Extension to 8,192K Bytes	141,200	4,525	3,800		200
87085-120	Main Memory Extension to 12,288K Bytes	141,200	4,525	3,800		200
87285-160	Main Memory Extension to 16,384K Bytes	141,200	4,525	3,800		200
87050	Additional Byte Multiplexor	78,050	1,440	1,210		70
87060	Additional Block Multiplexor	78,050	1,440	1,210		70
87067	Third Integrated Disc Controller	163,810	6,245	5,250		535
SYSTEM 7.872 AND SYSTEM 7.872-2						
7872	Central Processor, 4,096K Bytes of Main Memory	4,900,920	172,860		156,780	38,815
7872-2	Central Processor, 4,096K Bytes of Main Memory	3,404,860	160,405	134,740		14,985

[1] Prices include maintenance.

[2] Price not set.

Siemens System 7.800

EQUIPMENT PRICES

	Purchase Price DM	Rental [1] (1-year lease) DM	Rental [1] (3-year lease) DM	Rental [1] (4-year lease) DM	Monthly Maintenance DM	
SYSTEM 7.875-2						
7875-2	Central Processor, 8,192K Bytes of Main Memory	3,693,540	166,375	139,755	133,100	16,545
87585-120	Main Memory Extension to 12,288K Bytes	223,000	8,000	6,720	6,400	400
87585-160	Main Memory Extension to 16,384K Bytes	223,000	8,000	6,720	6,400	400
87585-240	Main Memory Extension to 24,576K Bytes	446,000	16,000	13,440	12,800	800
87550	Additional Byte Multiplexor	78,050	1,440	1,210	1,150	70
87560	Additional Block Multiplexor	78,050	1,440	1,210	1,150	70
SYSTEM 7.880						
7880	Central Processor, 4096K Bytes of Main Memory	4,860,000	144,942		131,460	22,788
88080-60	Main Memory Extension to 6144K Bytes	296,000	17,409		15,792	1,101
88080-80	Main Memory Extension to 8192K Bytes	296,000	17,409		15,792	1,101
88080-100	Main Memory Extension to 10240K Bytes	296,000	17,409		15,792	1,101
88080-120	Main Memory Extension to 12288K Bytes	296,000	17,409		15,792	1,101
88080-140	Main Memory Extension to 14336K Bytes	296,000	17,409		15,792	1,101
88080-160	Main Memory Extension to 16384K Bytes	296,000	17,409		15,792	1,101
88050-3	Third Byte Multiplexor Channel	158,142	5,303		4,455	312
88050-4	Fourth Byte Multiplexor Channel	158,142	5,303		4,455	312
88050-5	Fifth Byte Multiplexor Channel	158,142	5,303		4,455	312
88050-6	Sixth Byte Multiplexor Channel	158,142	5,303		4,455	312
88060-11	Eleventh Block Multiplexor Channel	158,142	5,303		4,455	312
88060-12	Twelfth Block Multiplexor Channel	158,142	5,303		4,455	312
88060-13	Thirteenth Block Multiplexor Channel	158,142	5,303		4,455	312
88060-14	Fourteenth Block Multiplexor Channel	158,142	5,303		4,455	312
88062	Two-Byte Feature	2,768	89		80	3
88041	Subchannel Extension for I/O Processor	[2]	—		—	—
88082	Expansion Processor	4,970,300	138,705		125,811	20,358
SYSTEM 7.880-2						
7880-2	Central Processor, 8,192K Bytes of Main Memory	4,765,740	196,375	164,955	157,100	17,585
88085-120	Main Memory Extension to 12,288K Bytes	223,000	8,000	6,720	6,400	400
88085-160	Main Memory Extension to 16,384K Bytes	223,000	8,000	6,720	6,400	400
88085-240	Main Memory Extension to 24,576K Bytes	446,000	16,000	13,440	12,800	800
88085-320	Main Memory Extension to 32,768K Bytes	446,000	16,000	13,440	12,800	800
88050	Additional Byte Multiplexor	78,050	1,440	1,210	1,150	70
88060	Additional Block Multiplexor	78,050	1,440	1,210	1,150	70
SYSTEM 7.881-2						
7881-2	Central Processor, 8,192K Bytes of Main Memory	6,359,740	217,875	183,015	174,300	18,685
SYSTEM 7.882						
7882	Central Processor, 4096K Bytes of Main Memory	9,830,300	283,647		275,271	43,146
88280-60	Main Memory Extension to 6144K Bytes	296,000	17,409		15,792	1,101
88280-80	Main Memory Extension to 8192K Bytes	296,000	17,409		15,792	1,101
88280-100	Main Memory Extension to 10240K Bytes	296,000	17,409		15,792	1,101
88280-120	Main Memory Extension to 12288K Bytes	296,000	17,409		15,792	1,101
88280-140	Main Memory Extension to 14336K Bytes	296,000	17,409		15,792	1,101
88280-160	Main Memory Extension to 16384K Bytes	296,000	17,409		15,792	1,101
SYSTEM 7.882-2						
7882-2	Central Processor, 8,192K Bytes of Main Memory	6,665,480	226,750	190,470	181,400	20,370
88285-120	Main Memory Extension to 12,288K Bytes	223,000	8,000	6,720	6,400	400
88285-160	Main Memory Extension to 16,384K Bytes	223,000	8,000	6,720	6,400	400
88285-240	Main Memory Extension to 24,576K Bytes	446,000	16,000	13,440	12,800	800
88285-320	Main Memory Extension to 32,768K Bytes	446,000	16,000	13,440	12,800	800
88285-480	Main Memory Extension to 49,152K Bytes	892,000	32,000	26,880	25,600	1,600
88285-640	Main Memory Extension to 65,536K Bytes	892,000	32,000	26,880	25,600	1,600
PERIPHERALS						
3879	Power Supply Controller	[2]	—		—	—
3801	Channel Processor	28,930	937		850	29
38012	Two-Channel Switch	5,786	187		170	6
3806	Workstation	97,500	3,055		2,772	421
3806-2	Workstation	26,870	1,205	1,010		290
3807	Service Processor	153,020	5,645		5,118	896
3807-2	Workstation	26,870	1,205	1,010		290
3808	Service Processor	394,510	11,854		10,752	1,555

[1] Prices include maintenance.

[2] Price not set.

Siemens System 7.800

EQUIPMENT PRICES

		Purchase Price DM	Rental [1] (1-year lease) DM	Rental [1] (3-year lease) DM	Rental [1] (4-year lease) DM	Monthly Maintenance DM
PERIPHERALS (Continued)						
3808-2	Service Processor	194,260	9,875	8,295	7,900	1,415
3803	Console Printer	[2]	—		—	—
3803-65	Console Printer	21,563	1,134		952	332
3815-1	Card Reader 1250 cpm	69,437	2,748	2,308		707
3815-2	Card Reader 1250 cpm	94,053	3,511	2,949		921
38152	Two-Channel Switch	9,079	264	222		58
3816-1	Card Punch 250 cpm	62,258	2,589	2,175		572
3816-2	Card Punch 250 cpm	104,350	4,232	3,555		1,105
38162	Two-Channel Switch	9,123	295	247		53
3817	Floppy Disk	51,264	1,732	1,455		148
38172	Two-Channel Switch	8,468	225	190		16
3833	Chain Printer	125,358	7,473	6,277		2,799
38335	Expansion of Print to 150	4,238	252	212		74
38332	Two-Channel Switch	15,970	499	420		152
38336-1	Train Cartridge	24,242	1,225	1,029		844
38336-2	Train Cartridge	24,242	1,225	1,029		844
38336-3	Train Cartridge	24,242	1,225	1,029		844
38336-4	Train Cartridge	24,242	1,224	1,029		844
38336-5	Train Cartridge	24,242	1,224	1,029		844
3814	Switch	69,441	1,720	1,445		174
38141-11	Expansion Module	14,554	415	349		37
38141-12	Expansion Module	10,002	270	227		12
38141-13	Expansion Module	14,554	415	349		37
38141-14	Expansion Module	19,411	551	463		49
3850-1	Magnetic Tape Controller	72,820	2,960	2,486		552
38502-1	Two-Channel Switch	10,744	430	361		24
38508-1	800-bpi Recording Density Feature	6,515	261	219		5
3850-2	Magnetic Tape Controller (2 Channels)	159,749	6,486	5,448		1,155
38502-2	Two-Channel Switch	21,488	861	723		49
38506-2	Attachment for Expansion to 16 Drives	14,110	565	475		49
38508-2	800-bpi Recording Density Feature	13,031	523	439		9
3850-3	Magnetic Tape Controller (4 Channels)	236,598	9,608	8,071		1,733
38502-3	Two-Channel Switch	32,233	1,290	1,084		74
38506-3	Attachment for Expansion to 16 Drives	18,139	729	612		74
38508-3	800-bpi Recording Density Feature	19,546	783	658		14
3850-4	Magnetic Tape Controller (4 Channels)	312,435	12,688	10,658		2,285
38502-4	Two Channel Switch	42,976	1,720	1,445		99
38506-4	Attachment for Expansion to 16 Drives	21,157	849	713		74
38508-4	800-bpi Recording Density Feature	26,061	1,044	877		20
3854	Magnetic Tape Unit 160/320KBS	54,086	2,295	1,928		575
3857	Magnetic Tape Unit 200/780KBS	51,417	2,100	1,764		463
3859	Magnetic Tape Unit 320/1250KBS	56,381	2,435	2,045		598
3848	Drum Controller	166,260	7,710	6,476		1,886
38482-1	First Two-Channel Switch	13,380	623	523		48
38482-2	Second Two-Channel Switch	18,975	885	743		68
38484	Expansion to 4 Drums	13,800	640	538		49
3849	Drum Store	369,599	16,286	13,680		3,066
3840	Disk Controller	118,620	5,323	4,471		596
38402-1	First Two-Channel Switch	11,042	488	410		49
38402-2	Second Two-Channel Switch	11,042	488	410		49
38403	317MB Option for 3840 Controller	12,863	610	512		54
38406	Attachment for Expansion to 64 Drives	29,670	1,243	1,044		112
38404	Controller Adapter	19,321	927	779		86
38405-1	Dynamic Trunk Switch	14,238	614	516		48
38405-2	Manual Trunk Switch	7,119	307	258		31
38408	Controller Adapter	38,641	2,165	1,819		217
38409-1	Dynamic Trunk Switch	28,475	1,229	1,032		121
38409-2	Manual Trunk Switch	14,238	614	516		62
3842	Removable Disk Storage Unit (2X200MB)	97,744	5,255	4,414		796

[1] Prices include maintenance.

[2] Price not set.

Siemens System 7.800

EQUIPMENT PRICES

		Purchase Price DM	Rental [1] (1-year lease) DM	Rental [1] (3-year lease) DM	Rental [1] (4-year lease) DM	Monthly Maintenance DM
PERIPHERALS (Continued)						
38424	Disk Storage Interface	8,309	428	360		55
38428	Disk Storage Interface for Simultaneous Access	19,000	804	675		114
3843-1	Fixed Disk Storage Unit (2X317MB)	87,618	3,385	2,843		795
3843-14	Fixed Disk Storage Unit (2X317MB including 2X1.44MB Fixed Head Storage)	109,361	4,230	3,553		1,025
3843-2	Fixed Disk Storage Unit (2X317MB)	69,386	2,687	2,257		596
3843-24	Fixed Disk Storage Unit (2X317MB including 2X1.44MB Fixed Head Storage)	91,129	3,532	2,967		826
3843-3	Fixed Disk Storage Unit (2X317MB)	87,618	3,385	2,843		795
3843-34	Fixed Disk Storage Unit (2X317MB including 2X1.44MB Fixed Head Storage)	109,361	4,230	3,553		1,025
38438-1	Disk Storage Interface for Simultaneous Access	11,945	352	296		136
38438-2	Disk Storage Interface for Simultaneous Access	11,945	352	296		136
38438-3	Disk Storage Interface for Simultaneous Access	11,945	352	296		136
38439-1	Dynamic Trunk Storage	10,115	381	320		37
38439-3	Dynamic Trunk Storage	10,115	381	320		37
3846-1	Fixed Disk Storage Unit (2X635MB)	99,352	2,738	2,300		392
3846-14	Fixed Disk Storage Unit (2X635MB including 2X1.44MB Fixed Head Storage)	126,597	3,489	2,931		549
3846-2	Fixed Disk Storage Unit (2X635MB)	72,140	1,987	1,669		289
3846-24	Fixed Disk Storage Unit (2X635MB including 2X1.44MB Fixed Head Storage)	99,352	2,738	2,300		392
3846-4	Fixed Disk Storage Unit (2X635MB)	109,288	3,012	2,530		431
3846-44	Fixed Disk Storage Unit (2X635MB including 2X1.44MB Fixed Head Storage)	139,256	3,838	3,224		599
38468	Disk Storage Interface for Simultaneous Access	11,945	352	296		136
38469-1	Dynamic Trunk Storage	10,115	381	320		37
38469-4	Dynamic Trunk Storage	20,230	762	640		74
3881	Multiplexer Controller	17,489	620	523		118
3882	Multiplexer Controller	16,267	544	457		61
3884-1	Controller	17,098	640	537		140
3884-2	Controller (SNA-M)	17,098	640	537		140
3884-3	Controller	12,804	475	399		127
38804-1	Expansion Module	2,434	168	141		2
38804-2	Expansion Module	2,434	168	141		2
38804-3	Disk Storage Interface (4)	1,186	44	37		5
38804-4	Expansion Module	1,779	68	57		7
38804-5	Disk Storage Interface (4)	1,186	44	37		5
38804-6	Expansion Module	1,779	68	57		7
38841-1	Two-Channel Switch	2,268	87	73		17
38841-2	BSC Connection	932	36	30		6
38841-3	Connection	932	36	30		6
38841-4	Connection	2,704	92	77		15
38841-5	Connection	2,704	92	77		15
3886-1	Visual Display Unit	7,714	210	177		35
3886-2	Visual Display Unit	4,834	186	156		36
3886-3	Visual Display Unit	7,251	280	235		54
3887-1	Visual Display Unit	7,714	210	177		35
3887-2	Visual Display Unit	4,834	186	156		36
3887-3	Visual Display Unit	7,251	280	235		54
38810-1	Keyboard	1,287	36	30		7
38810-2	Keyboard	1,750	50	42		9
38810-3	Keyboard	1,287	36	30		7
38810-7	Keyboard	1,312	50	42		9
38810-8	Keyboard	1,312	50	42		9
38810-10	Keyboard	1,312	50	42		9
38810-11	Keyboard	1,312	50	42		9
38802-1	Light Pen	1,524	42	35		3
38802-3	Light Pen	1,143	42	35		3
38802-4	Light Pen	1,143	42	35		3
38803-1	Badge Reader	1,887	57	48		23
38803-3	Badge Reader	1,623	64	53		22

[1] Prices include maintenance.

[2] Price not set.

Siemens System 7.800

EQUIPMENT PRICES

		Purchase Price DM	Rental [1] (1-year lease) DM	Rental [1] (3-year lease) DM	Rental [1] (4-year lease) DM	Monthly Maintenance DM
PERIPHERALS (Continued)						
38803-4	Badge Reader	1,623	64	53		22
38861-1	Four Printer Interface	345	13	11		2
38871-1	Four Printer Interface	345	13	11		2
3888-1	Printer Station	21,563	1,080	907		308
3888-2	Printer Station	21,563	1,080	907		308
3888-3	Character Printer	17,448	736	618		210
3888-4	Character Printer	21,810	920	773		262
3888-4	Character Printer	17,448	736	618		210
3888-6	Character Printer	21,810	920	773		262
3889-1	Line Printer	32,126	1,632	1,371		527
3889-2	Line Printer	32,126	1,632	1,371		527
38881-1	Four Printer Interface	345	13	11		2
38881-2	Four Printer Interface	345	13	11		2
38891-1	Four Printer Interface	345	13	11		2
38891-2	Four Printer Interface	345	13	11		2
3892-1	Communications Control Processor	231,785	7,743	6,504		1,749
3891-1	Communications Control Processor	128,770	4,299	3,612		972
38921-2	Channel Adapter	15,870	556	467		56
38921-3	Channel Adapter	31,730	1,113	934		71
38921-4	Channel Adapter	14,800	474	398		47
38922-2	Communication Scanner	71,310	2,429	2,041		259
38912-2	Second Communication Scanner	39,615	1,349	1,134		144
38923-2	Extension to 128K Bytes	22,400	1,349	1,134		79
38924-1	Line Interface Base	3,840	136	115		17
38924-2	Line Interface Base	19,200	668	561		86
38925-1	Line Set	5,835	191	160		29
38925-2	Line Set	7,060	266	223		66
38925-3	Line Set	14,150	499	420		67
38925-4	Line Set	12,740	399	336		60
38925-5	Line Set	7,170	212	178		31
38925-6	Line Set	13,272	435	365		69
38926	Expansion Module	58,770	1,979	1,663		140
38927-1	Two-Channel Switch	5,535	189	159		17

[1] Prices include maintenance.

[2] Price not set.