Siemens 7.800 Series

MANAGEMENT SUMMARY

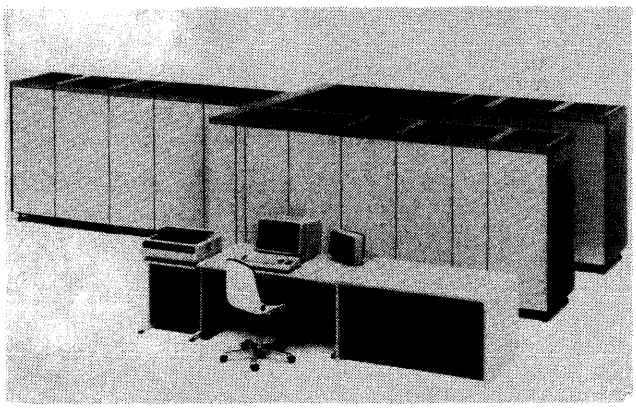
Since its introduction in October 1978, the Siemens 7.800 series, based on Fujitsu models, has undergone rapid expansion both to keep pace with IBM models, with which its machines are plug-compatible, and to keep abreast of other PCMs (Plug-Compatible Manufacturers) who offer similar systems. These include Fujitsu-based systems such as the ICL Atlas 10, and Amdahl's various models; and Hitachi-based machines from BASF, Olivetti, and NAS).

The Siemens range was introduced in four phases. The first coincided with the announcement in 1978 of the 7.870, 7.872, 7.880, and 7.882 designed to match the then existing IBM 303X models. A less powerful entry-level model, the 7.865 was announced in February 1980.

In January 1981, Siemens restructured the entire product line and (anticipating the arrival of the IBM 4341-2, the 3033S, 3033N, and 3081) launched the 7.875-2 and 7.881-2. This resulted in the current models: the 7.865-2, 7.870-2, 7.872-2, 7.880-2, 7.881-2, and 7.882-2, with the suffix 2 implying larger memories. All these models use 64K-bit chips. The 7.865-3 is an upgraded version of the 7.865-2, offering a 25 percent increase in processor performance.

The third phase was announced in mid-August 1982, when Siemens introduced its models in the 7.890 family, designated D, E, F, L, and S. The entry level to this part of the 7.800 series is the 7.890D and the top model is the 7.890S. These machines replace the previously introduced 7.890 series with the old 7.890 becoming the 7.890F.

In July 1983 Siemens announced the new entry-level model, the 7.860, in response to IBM's introduction of the 4381. The 7.860 is available in three models—the E, L, and R.



Pictured is the Siemens 7.890. The 7.800 Series compete with the IBM 4300 and 30XX Series. Main memory ranges from 12 to 32 megabytes.

The Siemens 7.800 series systems, now comprising 16 models, are IBM plug-compatible machines designed to compete with the IBM range stretching from the larger 4300 models to the 30XX mainframes. They are all based on Fujitsu products.

MODELS: Siemens 7.860E, 7.860L, 7.860R, 7.865-2, 7.865-3, 7.870-2, 7.872-2, 7.875-2, 7.880-2, 7.881-2, 7.882-2, 7.890D, 7.890E, 7.890F, 7.890L, and 7.890S.
CONFIGURATIONS: Single and dual processor systems with main memories ranging from 4M to 128M bytes and from 6 to 64 input/output channels.
COMPETITION: IBM 4300 and 30XX series; BASF 7/7X and 7/8X systems; Amdahl 5800 series; NAS 6000, 8000, and 9000 systems; ICL Atlas 10 models.
PRICE: The entry-level 7.860E costs approximately DM 800.000; the most powerful model in the series, the 7.890S, is priced from DM 10.600.000.

CHARACTERISTICS

SUPPLIER: Siemens AG, 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.

COMPANY LOCATIONS: *Argentina:* Siemens SA, Avenida Pte. Julio, A. Roca 516. RA-1067 Buenos Aires. *Australia*: Siemens Ltd., 544 Church St., Richmond, Melbourne, Vic 3121. *Austria*: Siemens AG, Siemenstr. 88-92, A-1210 Vienna. Telephone (0222) 241508. *Belgium:* Siemens SA, Chaussée de Charleroi 116, B-1060 Brussels. Telephone (02) 536 2111. *Brazil*: Siemens SA, Av. Mutinga 3650, BR-05110 Sao Paulo-SP. *Canada*: Siemens Electric Ltd., 7300 Trans-Canada Hwy., Pointe Claire, Quebec H9R 1C7. *Colombia*: Siemens SA, Carrera 65, No. 11-83, Bogotá-6. *Costa Rica*: Siemens SA, La Uruca, Apartado 10022, San José. *Denmark*: Siemens A/S, Borupvang 3, DK-2750, Ballerup. Telephone (02) 656565. *Eire*: Siemens Ltd., 8 Raglan Rd., Dublin 4. *Finland*: Siemens Osakeyhtiö, Mikonkatu 8, SF-00100 Helsinki 10. *France*: Siemens SA, 39-47 boulevard Ornano, F-93200 Saint-Denis. Telephone (01) 820 6316. *India*: Siemens India Ltd., 134 A, Dr. Annie Besant Rd., Worli, Bombay 400 018. *Italy*: Siemens Elettra S.p.A., Via Fabio Filzi 29, I-20124 Milan. Telephone (02) 252 0441. *Japan*: Siemens K.K., Gotanda Fujikura Bldg., 11-20 Nishigotanda 2-chome, Shinagawa-ku, Tokyo 141. *Mexico*: Siemens SA, Poniente 116, No. 590, Col. Ind. Vallejo, Deleg. Axcapotzalco, 02300 Mexico, D.F. *Netherlands*: Siemens Nederland n.v., Wilhelmina van Pruisenweg 26, NL-2595 AN, The Hague. Telephone (070) 782782. *Norway*: Siemens A/S, Østre Aker vei 90, N-Oslo 5. *Portugal*: Siemens S.A.R.L., Av. Almirante Reis 65, P-1100 Lisbon 1. *South*

© 1984 DATAPRO RESEARCH CORPORATION, DELRAN, NJ 08075 USA
REPRODUCTION PROHIBITED

Siemens 7.800 Series

TABLE 1. CHARACTERISTICS OF SIEMENS 7.800 SERIES

MODEL	7.860E	7.860L	7.860R
SYSTEM CHARACTERISTICS			
Date of introduction	July 1983	July 1983	July 1983
Date of first delivery	Dec. 1983	Feb. 1983	Mar. 1983
Number of central processors	1	2	2
Principal operating systems	BS3000/OS/VS1/MVS/VM/370		
Purchase price, entry system (CPU) (in DM)	807.200	1.352.800	1.614.400
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	8	8
Maximum capacity, megabytes	16	24	32
Increment size, megabytes	4	4,8	8
Error correcting memory	Standard	Standard	Standard
BUFFER STORAGE			
Cycle time, nanoseconds	—	—	—
Bytes fetched per cycle	32	32	32
Capacity, bytes	32,768	2 x 32,768	2 x 32,768
Time to fetch 8 bytes, nanoseconds	—	—	—
RELOADABLE CONTROL STORAGE			
Capacity	NA	NA	NA
PROCESSING UNIT			
Machine cycle time, nanoseconds	—	—	—
Relative performance level (est.)	—	—	—
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

Siemens AG is one of the five largest electronics and electrical companies in the world. It is divided into the six product groups of components, power engineering and automation, electrical installations, communication and information systems, medical engineering, and telecommunications networks and security systems. As well as the 7.800, computer-associated products include the Siemens-built 7.500 and 7.700 mainframes; small business systems; word processing and teleprocessing systems; and peripheral equipment. Sales of electronic products and systems account for approximately half of Siemens' sales.

The 7.800 series belongs to the communication and information systems group which accounted for sales of DM 2.4 billion in 1982/83, approximately 6 percent of the total sales revenue; the whole Siemens group had a sales revenue in 1982/83 of DM 39.4 billion. Siemens has about 310,000 employees worldwide, two-thirds of whom work within Germany.

The 7.800 series is marketed in Austria, Belgium, France, Italy, Netherlands, Sweden, and Switzerland; and also in South Africa.

Africa: Siemens Ltd., Siemens House, Cnr. Wolmarans & Biccard Sts., Braamfontein 2001, Johannesburg 2000. Telephone (11) 715911. _Spain_: Siemens SA, Orense 2, Madrid 20. Telephone (01) 754 1700. _Sweden_: Siemens Aktiebolag Norra, Stationsgatan 63-65, S-10435 Stockholm. Telephone (08) 989700. _Switzerland_: Siemens Albis AG, Freilagerstr. 28, CH-8047 Zürich. Telephone (01) 495 3111. _United Kingdom_: Siemens Ltd., Siemens House, Windmill Rd., Sunbury-on-Thames, Middlesex TW16 7HS. Telephone (09327) 85691. _USA_: Siemens Corp., 186 Wood Av. South, Iselin, NJ 08830. _Venezuela_: Siemens SA, Avenida Don Diego, Cisneros, Urbanización los Ruices, Caracas 1010 A.

MODELS: 7.860E, 7.860L, 7.860R, 7.890D, 7.890E, 7.890F, 7.890L, and 7.890R. (Models 7.865-2, 7.865-3, 7.870-2, 7.872-2, 7.875-2, 7.880-2, 7.881-2, and 7.882-2 are no longer actively marketed).

DATA FORMATS

BASIC UNIT: The 8-bit byte. Each byte can represent one alphanumeric character or two BCD digits. Two bytes represent a half-word, four bytes a word, and eight bytes a double-word.

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

© 1984 DATAPRO RESEARCH CORPORATION, DELRAN, NJ 08075 USA
REPRODUCTION PROHIBITED

Siemens 7.800 Series

TABLE 2. CHARACTERISTICS OF SIEMENS 7.800 SERIES

MODEL	7.890D	7.890E	7.890F	7.890L	7.890S
SYSTEM CHARACTERISTICS					
Date of introduction	Aug. 1982	Aug. 1982	Aug. 1982	Aug. 1982	Aug. 1982
Date of first delivery	—	—	—	—	—
Number of central processors	1	1	1	2	2
Principal operating systems	BS3000/OS/VS1/MVS/VM/370/MVS/SP VERSION 2				
Purchase price, entry system (CPU) (in DM)	3.444.000	4.798.000	5.825.000	7.850.000	10.649.000
MAIN STORAGE					
Storage type	MOS	MOS	MOS	MOS	MOS
Read cycle time, nanoseconds	—	—	—	—	—
Write cycle time, nanoseconds	—	—	—	—	—
Bytes fetched per cycle	8	8	8	8	8
Storage interleaving	4-way	4-way	4-way	4-way	4-way
Minimum capacity, megabytes	8	16	16	16	32
Maximum capacity, megabytes	32	32	64	64	128
Increment size, megabytes	8	8	8	8	16
Error correcting memory	Standard	Standard	Standard	Standard	Standard
BUFFER STORAGE					
Cycle time, nanoseconds	—	—	—	—	—
Bytes fetched per cycle	64	64	64	64	64
Capacity local buffer/CPU (KB)	16	32	64	32	64
Capacity global buffer/MCU (KB)	128	128	256	128	256
RELOADABLE CONTROL STORAGE					
Capacity	—	—	—	—	—
PROCESSING UNIT					
Machine cycle time, nanoseconds	—	—	—	—	—
Relative performance level (est.)	1.0	1.4	1.8	2.4	3.4
Instruction prefetch	Standard	Standard	Standard	Standard	Standard
Processing unit features					
Clock Comparator and CPU Timer	Standard	Standard	Standard	Standard	Standard
Dynamic Address Translation	Standard	Standard	Standard	Standard	Standard
Floating-Point	Standard	Standard	Standard	Standard	Standard
Direct Control	Standard	Standard	Standard	Standard	Standard
Instruction Retry Hardware	Standard	Standard	Standard	Standard	Standard
Multiprocessor systems					
Tightly coupled	—	—	—	Yes	Yes
Loosely coupled	—	—	—	Yes	No
Attached processor system	No	No	No	No	No
Integrated storage control	Yes	Yes	Yes	Yes	Yes
I/O CONTROL					
Integrated channels, standard	8	16	16	16	16
Integrated channels, optional	24	24	24	24	48
Data rate, bytes per second					
Byte multiplexer	110K	110K	110K	110K	110K
Block multiplexer	3000M	3000M	3000M	3000M	3000M

The 7.890 family is extremely powerful with the 7.890F being equal to the IBM 3081KX in performance, and the top model, the 7.890S, comparable to the IBM quadri-processor, the 3084QX.

One of the most significant aspects of all the models in this Siemens 7.800 range is the software. Siemens has not set out to track IBM's offerings in this area exactly, but to enable users to transfer from IBM to Siemens with relatively little overhead in software changes. Thus, transferees to Siemens will find that they can use MVS/OS/VM operating systems and Siemens BS3000 operating system, which provide a functional equivalent of IBM's OS/VS2 (MVS).

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.

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. Models 7.865-2 and 7.865-3 have 189 instructions; Models 7.870-2 and 7.872-2 have 193 instructions; and Models 7.875-2, 7.880-2, 7.881-2, and 7.882-2 have 195 instructions, as do the 7.890 models.

© 1984 DATAPRO RESEARCH CORPORATION, DELRAN, NJ 08075 USA
REPRODUCTION PROHIBITED

Siemens 7.800 Series

All 7.800 models can be operated under BS3000, MVS/SP1, and VM, while the 7.890 models can additionally use MVS/SP2. MVS/SP2 is scheduled to run on the 7.860 in December 1984.

There are currently two active subranges, the 7.860 and the 7.890, within the 7.800 series. The two other subranges, (comprising the 7.865-2, 7.865-3, 7.870-2 and 7.872-2; and the 7.875-2, 7.880-2, 7.881-2 and 7.882-2), are no longer in production. Within a subrange one machine can be field upgraded to another, but this is not the case from one subrange to another. The 7.860 models are the most recently introduced and comprise the 7.860E, 7.860L, and 7.860R. The 7.890 systems, (which comprise Models D, E, F, L, and S) are by far the most powerful within the 7.800 Series.

Across the entire 7.800 family of 16 systems, considerable attention has been paid to optimizing functional efficiency. This is done by the usual mixture of high-speed buffers used as a cache memory, separate input/output processors, pipe-lining techniques on some models, virtual addressing, and the use of a microprogrammed instruction execution unit. Functional efficiency and reliability are helped by the use of 64K-bit chips and LSI (Large Scale Integration) which have become charateristics of Japanese computers, such as the Fujitsu range on which the 7.800 series is based. Dual systems with multiprocessing and shared memory are standard on some members of the 7.800 range.

The entry-level subrange, comprising the 7.860E, L, and R, competes with the IBM 4381. The 7.860E is termed a Uniprocessor System and contains one Central Processing Unit (CPU); one Main Storage Unit (MSU) with between 4 and 16 megabytes of main memory; one input/output processor, called a Channel Processor (CHP) by Siemens; one Service Processor (SP); one console; and one hard copy printer. The Service Processor manages communications between the operating system and the operator.

The 7.860L is a Dyadic Processor System which contains two CPUs, one MSU, two CHPs, one SVP, one console, and one 200 cps printer. The MSU has a minimum storage capacity of 8MB which can be increased to 24MB. Two block multiplexer channels and ten byte multiplexer channels are standard on the 7.860L; the two CHPs can optionally support four additional block multiplexer channels.

The 7.860R Multiprocessor System is a duplicated Uniprocessor System and as such comprises two CPUs, two MSUs, two CHPs, two SVPs, two consoles, and two 200 cps printers. The system has a minimum storage capacity of 8MB which can be increased to 32MB. The two CHPs provide a total of 16 channels of which 2 are block multiplexer channels and 14 are byte multiplexer channels.

The main function of the Channel Processors is to conduct data to the peripherals which are attached directly to them. Each Channel Processor (CHP) services both block and byte multiplexer channels. Each of the processors has a maximum of eight channels. The various permutations of byte and block multiplexer channels which may be at-

INTERNAL CODE: EBCDIC.

MAIN STORAGE

STORAGE TYPE: N-MOS semiconductor memory composed of 64K-bit chips is used for all models, except the 7.890 which uses 256K-bit chips.

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 2KB 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 three CPU models in the 7.800 series, each of which can be ordered in a single- or dual-processor configuration. All models have a separate channel processor and a separate service processor. In addition, the smallest model has 8K 96-bit words of reloadable control storage and, optionally, an integrated disk controller. The larger models cycle more than four times as fast, have eight times as much cache memory, and twice as many standard channels.

REGISTERS: All models have sixteen general purpose, 32-bit registers; sixteen (to avoid adjacent numbers) 32-bit control registers; and four 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. The 7.890 models also have a global cache of 128K or 256K 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 (7.860E, 7.860L, 7.860R) have 8K 96-bit words of reloadable control storage. The medium-sized processors are hard-wired, while the 7.890 models are microcoded.

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 look-aside buffer holds information on those most recently used (up to) 512 pages. A segment table origin stack is used to keep track of which virtual space each page belongs.

COMPATIBILITY FEATURES: The 7.800 series is 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

© 1984 DATAPRO RESEARCH CORPORATION, DELRAN, NJ 08075 USA
REPRODUCTION PROHIBITED

Siemens 7.800 Series

tached to these Channel Processors can be seen from the Characteristics section of this report under Input/Output Control. An optimizing feature of CHPs is the availability of an address translation facility which reduces the workload on the operating system when virtual addresses are used in programs destined to be used by a CHP. This facility is available only on BS3000-controlled 7.800 systems.

The second subrange, comprising the single-processor Models 7.865-2, 7.865-3, 7.870-2, and the dual-processor 7.872-2, is not available as new equipment. This range provides main memory capacity ranging from 4M bytes to 16M bytes.

The third subseries of the 7.800 range, comprising the 7.875-2, 7.880-2, 7.881-2, and 7.882-2, has also been withdrawn from production.

The most powerful members of the 7.800 range are gathered into the 7.890 subseries and comprise the 7.890D, 7.890E, 7.890F, 7.890L, and 7.890S. The single-processor 7.890D has a main memory range of 8M to 32M bytes, while the Model/E, which is an upgraded Model D, starts with a minimum of 8M bytes, extendable to 64M bytes. The Model F is also, in essence, an upgraded D and has a maximum 64M bytes of memory. Both Models L and S are dual- processor systems.

All the 7.890-level machines are based on the Fujitsu Model M380. They not only have the pipelining used on the middle 7.800 subrange, but also have 31-bit real addressing which is needed for MVS/XA implementation, in addition to cache memory common throughout the 7.800 range.

Some idea of the relative power of these systems can be gained by looking at the figures supplied by Siemens: the 7.890D can be field upgraded to the 7.890E with a performance increase of around 1.3; the Model E upgrades to the Model F with a similar factor for performance increase; Model F upgrades to Model L with a 1.2 factor; and Model L upgrades to the top model, the 7.890S, with an improvement factor of about 1.4.

The 7.890 Models D, E, F, and L can have up to three Channel Processors, giving 24 channels, while the 7.890S can support a total of six Channel Processors.

A very wide spectrum of peripherals can be used with the 7.800 systems. The details are contained in the Characteristics section of this report.

SOFTWARE

The main operating system in use on the 7.800 is IBM's MVS/SP Version 2 (MVS/XA). Approximately 80 percent of programs are written to run under MVS/SP, while most of the remaining 20 percent run under Siemens' own operating system, BS3000. In addition to this, there is the Siemens teleprocessing system, called FNA. (Free Network Architecture), AIM (Advanced Information Manager)

instruction is identified, both the next instruction and the instruction located at the branch address are preprocessed.

Memory on the 7.860E, 7.860L, 7.860R, 7.865-2, 7.865-3, 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.

3805 CONSOLE: This desktop unit contains a three-color display with 80 lines of 27 characters, a single operator keyboard, and two diskette drives for loading microcode and software. A hard copy printer is included. One 3805 is needed with the 7.860E and 7.860L, while the 7.860R uses two 3805 consoles.

3806-2 CONSOLE: This desk-sized unit contains a single-color display, single operator keyboard, and two diskette drives for loading microcode and diagnostic software. A hard copy 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.

3808-2 CONSOLE: This desk-sized unit contains two displays, two keyboards, and two diskette 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 the 7.882-2 systems, either console can access any part of the system.

3809 CONSOLE: A desk-sized unit containing one display with keyboard and three diskette drives. These are used for loading microcode, loading diagnostic software, and for storing maintenance information. A hard copy printer is also a standard fitting.

I/O CONTROL: Peripherals are attached to 7.800 systems via independent Channel Processors (CHPs) 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 7.860E system has one CHP with one byte-multiplexer and seven block-multiplexer channels. The 7.860L has two CHPs, and a total of 2 byte-multiplexer and 10 block-multiplexer channels. Four optional block-multiplexer channels can be added into the system. The 7.860R contains two CHPs with 2 byte-multiplexer and 14 block- multiplexer channels. A 7.865-2 or 7.870-2 system has one CHP 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 CHP is 14 megabytes/second.

A 7.872-2 system has two CHPs, each accessible to either processor.

© 1984 DATAPRO RESEARCH CORPORATION, DELRAN, NJ 08075 USA
REPRODUCTION PROHIBITED

Siemens 7.800 Series

which is a database allied with communications system, and other aids which handle networking (NJP—Network Job Processing), manage resources (9RMF—Resource Management Facility), deal with telecommunications (TCAM—Telecommunication Access Method), facilitate emulation (PEP—Partitioned Emulation Program), and use IBM optical character equipment via IBM-OCR support. Compilers and Assemblers offered for the 7.800 range include Cobol, Pascal, PL/1 (PL/1 Optimizer), Basic Algol, Fortran 77, and Assembler (Assembler-H).

The 7.800 range has interface compatibility with the comparable IBM System/370 and 30XX. The 7.800 can be integrated into a hardware and software network with IBM systems.

In addition to MVS/SP, the IBM operating system VM can be used on the System 7.800 without change together with the corresponding SP products and licensed programs. All peripheral devices with interfaces compatible with the "IBM Interface Specification" may be connected to a central processor of the 7.800.

IBM's VM/370 and MVS/370 and the associated Systems Extensions (SE) and Systems Products (VM/SP and MVS/SP Version 1) will also run on the 7.800 range.

COMPETITIVE POSITION

The 7.800 competes with the IBM 30XX and 4300 Series. The entry-level 7.860 offers comparable performance levels with the IBM 4381. Specifically, the 7.860E and the 4381 Model 2 are similar, however the Model E sells for approximately 25 percent less than the IBM machine. The top subrange, the 7.890, competes against the 308X; the 7.890F is as powerful as the 3081KX, while the top model, the 7.890S, is comparable to the 3084QX.

Other PCM competitors include the Fujitsu-based Amdahl 580, the Hitachi-based BASF 7/7X and 7/8X, and the NAS Advanced Systems 6000, 8000, and 9000 Series.

ADVANTAGES AND RESTRICTIONS

There are very definite advantages in Siemens, BASF, and other PCMs' products over those of IBM. The PCM system requires less power, lower outlay, and less space, and uses better technology. The PCM products have also achieved an excellent reputation for reliability.

The general disadvantages of PCM products can be divided into two areas—software and markets, neither of which, it should be emphasized, detract from the intrinsic attractions of the systems. The software uncertainty is whether the PCMs will continue to maintain compatibility with IBM, how much so, and whether it is important in the long run. The query about the market is whether there exists a viable sales sphere for such products.

USER REACTION

The 1983 Datapro Survey of German Users of Computer Systems brought responses from users of six Siemens 7.800

A 7.875-2 or 7.880-2 system has one CHP with 2 byte-multiplexer channels and 6 or 10 block multiplexer channels, respectively. More channels can be added up to a total of 16, and the CHP can support 2048 subchannels. Byte multiplexers have a transfer rate of 110 kilobytes/second, and block multiplexers, 2.0 megabytes/second. The total transfer rate of the CHP is 20 megabytes/second.

A 7.881-2 or 7.882-2 system has two CHPs each accessible to either processor. All CHPs can be equipped with datastreaming channels.

The 7.890 models have two CHP elements numbered 89044 and 89045. The number of these which are fitted depends on whether the system is intended to run under the Siemens operating system BS 3000, or under IBM operating systems, such as MVS. The permutations of these elements and details of channels can be seen from the table of "Characteristics of the Siemens 7.800 Series" which describes the 7.890 models.

MASS STORAGE

FIXED DISKS—MODEL 3843: There can be one or two drives of this unit, which can be considered as two drives of 317.5MB each or two drives of 100MB each. The average access time is 48.4 ms, including positioning time, and the transfer rate is 1198 KB/second.

FIXED DISKS—MODEL 3846: This is virtually identical to the Model 3843, except that it has double the capacity. The space required for it is also not much greater. The 3843 can be regarded as either comprising two drives of 200MB each or two drives with a capacity of 635MB each. The other characteristics are identical to the Model 3843, that is, an average access time of 48.4 ms, including positioning and a transfer rate of 1198KB/second.

FIXED DISKS—MODEL 3848: This unit contains two drives, each with a capacity of 1260MB, giving a total capacity of 2.52GB. Average access time is 16 ms, and the data transfer rate is 3MB per second.

REMOVABLE DISKS—MODEL 3842: This comprises one or two drives, each with a capacity of 200MB. The average access time, including positioning, is 58.4 ms, and the transfer rate is 806KB/second.

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 meters 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

© 1984 DATAPRO RESEARCH CORPORATION, DELRAN, NJ 08075 USA
REPRODUCTION PROHIBITED

Siemens 7.800 Series

installations, with an average length of installation of 13.5 months. Two systems were purchased, two were rented from Siemens, and two were leased from a third party. Application areas included accounting/billing, payroll/personnel, banking, and engineering.

None of the users planned to replace their systems during 1983; five hoped to buy further software from Siemens; and five wanted to implement business graphics. When the survey was conducted, five users had communications monitors, two used integrated word processing functions, and one had a data base management system.

Users were given a list of possible advantages and problems of a system, and were required to indicate which were relevant to the 7.800. Users specified easy expansion/reconfiguration of the system, a good response time, productivity aids which helped to reduce programming costs, and compatibility, as promised by Siemens, of terminals and peripherals from other systems. One user said that the total system cost was more than expected, and no other problems were indicated.

To the question "Did the system do what you expected it to do?", all six users said "Yes." When asked if they would recommend the system to another user, five said "Yes" and one was undecided.

Users were asked to evaluate the different aspects of their systems under the headings Excellent, Good, Fair, and Poor. The weighted average obtained is based on a scale of 4.0 for Excellent. The system ratings are summarized in the following table.

	Weighted Average
Ease of Operation	3.17
Reliability of Mainframe	3.83
Reliability of Peripherals	3.33
Maintenance Service:	
Responsiveness	3.50
Effectiveness	3.17
Technical Support:	
Troubleshooting	3.00
Education	2.33
Documentation	3.00
Manufacturer's Software:	
Operating System	3.20
Compilers & Assemblers	3.33
Applications Programs	2.80
Ease of Programming	2.83
Ease of Conversion	3.00
Overall Satisfaction	3.33 □

forward speed of 5.1 meters per second. Up to eight magnetic tape devices can be connected to all models via a 3850-1, -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, providing maximum printing rates of 1,477 to 1,060 lines/minute. Lines can be 132 or 136 characters long, 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, Model 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 data display terminals as well as the 3888 (matrix printers) and 3889 (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 4 terminals.

3884-3 CLUSTER CONTROLLER: The 3884-3 cluster controller permits the 3886 data display terminal and the 3888, 3893, and 3889 printer terminals to be connected to the Communications Control Processor. Up to 12 terminals can networked 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 the 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.

3886 DISPLAY TERMINAL SYSTEM: This consists of a controller (3884), four choices of display and separate keyboard (3886-2, 3886-4, 3886-3, and 3886-5) together with options such as a light pen attachment (38802), pass reader (38803), needle printer (3888) and line printer (3889). The actual displays are divided into two groups: the 3886-2 and 3886-4 which each have 24 lines of 80 characters and a 25th line for functions and operating communications; and the color models 3886-3 and 3886-5 which are identical with the other two models, except that they can display green, white, and red for graphic data. There are various keyboard options.

3888 PRINTER TERMINAL: The 3888-3 Printer Terminal is connected as an independent terminal to the 3884 Controller. Equipped with a 1920-character buffer, to match the characteristics of the display terminals, the 3888 prints at up to 180 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.

3884-4 PRINTER TERMINAL: Same specifications as the 3888-3, but possesses a forms attachment for the printing of single documents.

© 1984 DATAPRO RESEARCH CORPORATION, DELRAN, NJ 08075 USA
REPRODUCTION PROHIBITED

3889-1/-3 PRINTER TERMINAL: The 3889-1 printer terminal is connected as an independent terminal to the 3884 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 4096 bytes.

DATA COMMUNICATIONS

3893-3 COMMUNICATIONS CONTROL PROCESSOR: A programmable subsystem with between 256KB and 512KB of memory which can support up to 352 asynchronous or synchronous half-duplex lines. The processor uses the IBM 3705-II instruction set and supports the BSC and HDLC/SDLC protocols. Data is transferred in burst mode via a channel adapter and either a byte or block multiplexer channel.

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 multiuser 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 nonprivileged routines. The Control System is privileged and consists of the Executive, the Data Management System, the Teleprocessing System, and System Services. Nonprivileged 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 are connected. VTAM also supports locally connected terminals. The communications 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 nine 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 to 95 percent of all address references using this multilevel address translation scheme. When an address cannot be determined on the first pass through the ATM, a fallback 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.

In December 1982 Siemens announced a development of the BS3000 operating system called BS3000 MSP (Multiple System Product), whose main market is the large-system user. However, it can be applied on all 7.800 models. It supports 31-bit real and virtual addressing and permits bimodal operation.

The virtual address space is extended to two gigabytes with BS3000 MSP, and Siemens will be introducing new functions to take advantage of this enormous space. The first version of BS3000 MSP is called BS3000 MSP10.

The general development of BS3000 MSP will be along the following lines: BS3000 MSP will have interface and functional compatibility with MVS/SP1.3 and following versions. The control of a loosely coupled system will be made as simple as possible by "products that balance the loading of a system," enable a single console to control all systems, and enable magnetic tape drives to be assigned to different CPUs. New products will be brought out from time to time, for instance, Relational Database (AIM/RDB), for design and control of private databases; INTERACT for interaction and communications with applications programs, and ADAMS for program development and maintenance.

BS3000 MSP10, the initial version of BS3000 MSP, in conjunction with its associated job entry subsystems JES and JES/E, provides extensions to BS3000 in the field of coupling and extends developments towards compatibility with MVS/SP.

© 1984 DATAPRO RESEARCH CORPORATION, DELRAN, NJ 08075 USA
REPRODUCTION PROHIBITED

Siemens 7.800 Series

The Advanced Functions/Job Entry Subsystem and its extensions (AF-JES and AF-JES/E) offer new functions and facilities which include the following:

- support for IBM 3380 Direct Access Storage when installed with Data Management/Device Support Extension (DM/DSE) and Data Management/Integrated Data Services (DM/IDS) program products
- Cross Memory Services (CMS) allows data transfer, data access and program calls between two address spaces
- Virtual I/O Extended (VIO/E) allows direct or partitioned data to be held in main memory; such data sets can be temporary or permanent

BS3000 MSP 10 also includes Standard System Program Products (SSPPS) which consist of logical extensions to certain products to meet the needs of large-system users. These extensions usually involve the preprogramming of the available exits, the coding of various standard routines, and the modification of some system codes. SSPPs will be made available for the Resource Access Control Facility (RACF), System Management Facility (SMF), and Operation Procedure Facility (OPF).

In addition to the above, BS3000 MSP Version 10 offers Extended Console Support (ECS) which manages the full screen, split screen with a menu technique, and other operator-friendly facilities. An extension to ECS allows users to operate all machines of a Job Entry Subsystem/Multi-Access Spool (JES/MAS) from a single operator console.

Among the remaining parts of BS3000 MSP 10 are included the Relational Database (AIM/RDB), Advanced Query Language (AQL), AIM Database/Data Communications system (AIM DB/DC), and AIM/VSAM.

AIM/RDB is an extension of the Advanced Information Manager (AIM) DB/DC system. It offers database processing for interactive, on-line, and batch environments.

AQL, Advanced Query Language, enables end users to access relational databases from terminals or from programs. Relationships between data are not fixed.

AIM Database, Data Communications system, (AIM DB/DC) enables the user to define Codasyl-like data structures. The goal of AIM DB/DC is flexibility, insofar as the user need install only that which is required: for example, it can be used either as a pure database system or as a data communications monitor. Security and logging functions are provided for all users with large numbers of data sets, whether these be conventional sets or of the VSAM type.

AIM, Virtual Storage Access Method (AIM/VSAM) enables monitoring and recovery of VSAM data sets to be effected. All types of VSAM data sets (KSDS, ESDS, and RRDS) can be used with the same instructions as those used in general batch programs.

LANGUAGES: Ten languages are available on the System 7.800: RPG 2, Algol 60, ANS Cobol, Fortran 77, 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.

DATABASE 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 Codasyl standard.

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

SERVICE/SUPPORT

REMOTE DIAGNOSTICS: A Siemens service engineer at a service center can directly access a user's 7.800 system through the Siemens Teleservice System MART (Maintenance Assistance by Remote Teleprocessing) using a Teleservice terminal.

MAINTENANCE: The basic contract covers support and services between 0700 and 1800 Monday to Friday excluding public holidays. Maintenance times and costs outside these hours are detailed below, the percentage shown being a percentage of the basic maintenance contract.

Time of Day	Mon-Fri	Sat	Sun & Hol	Mon-Sun
0700-1800	—	7%	9%	—
0600-2200	16%	8%	10%	—
0000-2400	22%	11%	14%	42%

TRAINING: 7.800 system operating courses are included in the price of the system and can be run at a Siemens center or in-house. Siemens centers are sited throughout Germany, Austria, and Switzerland; and in Belgium, Denmark, France, Italy, Netherlands, Sweden, and Spain. Training courses paid for separately by the user include service of the 7.800, and software installation and operation, and vary in length from three days to two weeks.

DOCUMENTATION: General hardware and software documentation is provided free of charge with a 7.800 model. More detailed manuals can be purchased separately.

PRICING

System 7.800 is available for purchase and on one-year rental and three- and four-year lease plans. Listed below are examples of basic prices for each model. One should expect an immediate reaction by Siemens to any significant price changes by IBM.

The following prices have not been officially received from and confirmed by Siemens.

© 1984 DATAPRO RESEARCH CORPORATION, DELRAN, NJ 08075 USA
REPRODUCTION PROHIBITED

Siemens 7.800 Series

EQUIPMENT PRICES

	Purchase Price (DM)	One-Year Rental (1) (DM)	Three-Year Rental (1) (DM)	Monthly Maint. (DM)
7.860E with 4MB main memory	807.200	51.070	42.900	2.000
7.860L with 8MB main memory	1.352.800	87.020	73.100	3.400
7.860R with 8MB main memory	1.614.400	102.140	85.800	4.000
Additional 4MB main memory	100.000	3.570	3.000	200
7.890D with 8MB main memory	3.444.000	203.130	170.620	10.740
7.890E with 16MB main memory	4.798.000	251.250	211.050	13.830
7.890F with 16MB main memory	5.825.000	280.000	235.200	15.290
7.890L with 16MB main memory	7.850.000	372.500	312.900	18.980
7.890S with 32MB main memory	10.649.000	512.500	430.500	28.840
Additional 8MB main memory	262.500	13.130	11.020	790
Additional 16MB main memory	525.000	26.250	22.050	1.580
Additional 32MB main memory	1.050.000	52.500	44.100	3.160

(1) Price includes maintenance.
Note: a 4-year rental agreement is possible on all 7.890 models.

SOFTWARE PRICES

	Basic License Charge (DM)	Monthly Charge (DM)	Monthly Maintenance (DM)
ADAM/B	109.060	2.500	400
ADAM/D	87.250	2.000	320
AIM/DB (Advanced Information Management System/Database)	119.530	2.740	440
AIM/DC (/Data Communications)	144.390	3.310	530
AIM/RDB (/Relational Database)	59.760	1.370	220
AIM/VSAM (/Virtual Storage Access Method)	20.500	470	80
DM/DSE (Data Management/Device Support Extension)	7.420	170	30
DM/IDS (/Integrated Data Services)	7.420	170	30
ECS (Extended Support Control)	13.520	310	50
INTERACT	21.810	500	80
QUERY	42.310	970	160
RACF (Resource Access Control Facility)	62.160	1.480	220
SAVEHALT	17.710	420	60
SCREEN-MANAGER	25.740	590	90
SORT/MERGE	19.730	470	70
SSPP/OPF (Standard System Program Product/Operation Procedure Facility)	8.290	190	30
SSPP/RACF (/Resource Access Control Facility)	11.780	270	40
SSPP/SMF (/System Management Facility)	19.190	440	70
Algol	36.240	860	—
APL	24.410	560	—
Basic	10.910	250	—
Cobol	35.440	850	130
Fortran 77	25.390	600	90
Fortran 77/C	21.810	500	80
LISP	8.720	200	—
Pascal	25.300	580	—
PL/1	43.930	1.010	160
TestCob	34.750	780	120
TestFor77	20.710	500	80
TestPL/1	34.750	780	120

© 1984 DATAPRO RESEARCH CORPORATION, DELRAN, NJ 08075 USA
REPRODUCTION PROHIBITED