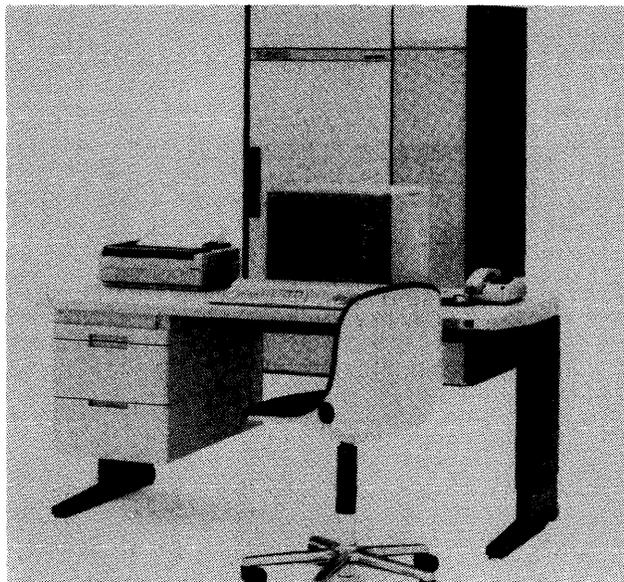# Siemens 7.500 Series

MANAGEMENT SUMMARY

UPDATE: *Siemens has added to and expanded its 7.500 System from three series (7.530, 7.550, and 7.570) to six series (7.560, 7.580, and 7.590), resulting in the incorporation of 12 additional models into the line. The 7.500 Series now includes a total of 22 different models. Main memory capacities now range from 2MB to 128MB.*

Siemens has made the 7.500 family a compatible series with one operating system which facilitates a smooth migration path. All of the models are completely compatible with each other and use the same 169 instruction sets as well as the BS2000 operating system. Other common features include fixed-point, floating-point, and decimal arithmetic; dynamic address translation; elapsed-time clock; three program timers; time-of-day clock; realtime clock; memory protection; automatic instruction retry; and error checking and correction in main memory. The six series that make up the Siemens 7.500 are the 7.530, 7.550, 7.560, 7.570, 7.580, and 7.590; each is available in a number of models. The low-end 7.530 Series consists of the 7.530-B, -C, -D, -F, and -H; the 7.550 contains the 7.536-20, 7.550-B, -D, and -N; the 7.560 consists of the 7.560-E, -F, and -H; the 7.570 contains the 7.570-B, -C, -G, and -P; the 7.580 contains the 7.580-D, -E, -I, and -S; and the top-end 7.590 contains the 7.590-G and -R.

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 telecom- ▷

The Models-B, -D, and -N of the Siemens 7.550 Processor System are high-performance machines within the Siemens 7.500 Series.

The Siemens 7.500 Series comprises 22 models divided into 6 basic groups; some models are offered in dual- as well as single-processor configurations. The series runs under the same operating system, BS2000, and provides a long upward migration path—the largest computer in the series has 80 times the power of the smallest.

MODELS: 7.530B, 7.530C, 7.530D, 7.530F, 7.530H, 7.536-20, 7.550B, 7.550D, 7.550N, 7.560E, 7.560F, 7.560H, 7.570B, 7.570C, 7.570G and 7.570P, 7.580D, 7.580E, 7.580I, 7.580S, 7.590G, and 7.590R.
MAIN MEMORY: 2MB to 128MB.
DISK CAPACITY: 63MB to 60GB.
TERMINALS: 240 concurrent users supported.
OTHER I/O: Document readers, impact printer, laser printers, disk storage units, and magnetic tape equipment.
PRICE: The entry-level 7.530B costs approximately DM 96.000, while the basic 7.570P is priced at DM 3.645.400.

CHARACTERISTICS

MANUFACTURER: Siemens AG, Bereich Datenverarbeitung, Otto Hahn Ring 6, Postfach 83 09 51, D-8000 München 83, West Germany. Telephone (089) 6361. Telex 521090.

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, Chausée de Charleroi 116, B-1060 Brussels. Telephone (02) 536 2111; *Brazil:* Siemens SA, Av. Mutinga 3650, BR-05110 São Paulo-SP; *Canada:* Siemens Electric Ltd., 7300 Trans-Canada Hwy., Pointe Claire, Quebec H9R 1C7; *Columbia:* 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, Ostre Aker vei 90, N-Oslo 5; *Portugal:* Siemens S.A.R.L., Av. Almirante Reis 65, P-1100 Lisbon 1; *South Africa:* Siemens Ltd., Siemens House, Cnr. Wolmarans & Biccard Sts., Braamfontein 2001, Johannesburg 2000. Telephone (11) 715911; *Spain:* Siemens SA, Orense 2, Madrid ▶

Siemens 7.500 Series

munication networks, and security systems. Computer-associated products include the 7.500, 7.700, and 7.800 mainframes; small business systems; word processing and teleprocessing systems; and peripheral equipment. Sales of electronic products and systems accounts for approximately half of the Siemens' sales by revenue.

The 7.500 competes against the IBM 4300 and 303X Series. During 1983, Siemens brought out the three new 7.500 model groups in response to the announcement of an enhanced IBM 4300 Series. Hardware and software compatibility is retained with the older series, which consisted of ten models. The current model range offers improved performance over the original 7.500 models, increased main memory and cache memory capacity, and enhanced input/output channels. The original 7.500 Series was introduced in 1979.

The 7.530 is particularly suited to office-environment sites since it can be installed in a room without a raised floor or air-conditioning. It is intended for general commercial data processing and engineering applications.

The 7.550 and 7.570 are intended for use in air-conditioned computer centers and are also suited to general data processing and engineering applications.

The 7.560 models are single-processor units that can be enhanced with an extra-performance module for scientific use. They are suitable for universal applications in commercial data processing or for scientific and technical problem solving.

The 7.580 models can be field-enhanced from the single-processor Model-D to the more powerful Models-E and -I, and eventually upgraded to the dual-Model-S with up to four I/O processors.

The 7.590 models represent the top-end of the System 7.500 range. The single-processor Model-G can be field-enhanced to the dual-CPU Model-R.

Basic main memory ranges from 2M bytes on the 7.530-B to 128M bytes on the 7.580 and 7.590. Memory can be increased, in increments of 2M bytes on the smaller models through to 32M bytes on the largest model, to a maximum of 128M bytes on the 7.580-S and 7.590-R. With the exception of the 7.530-B and 7.530-C, 7.536-20, and 7.530-D, all models use cache memory and a write buffer to speed up operations. The 7.550N is a dyadic system, containing two central processing units. The 7.570-P, 7.580-S, and 7.590-R are dual CPU systems. All the important components are duplicated to increase not only the speed, but also the availability and reliability of the systems.

All models use a separate central console workstation which comprises a VDU and keyboard, an optional printer, and ID Card Reader. A service processor, integrated into the central operator console, provides online maintenance functions and handles error recovery support when a malfunctioning component or the operating system can no ▷

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: 7.530B, 7.530C, 7.530D, 7.530F, 7.530H, 7.536-20, 7.550B, 7.550D, 7.550N, 7.560E, 7.560F, 7.560H, 7.570B, 7.570C, 7.570G, 7.570P, 7.580D, 7.580E, 7.580I, 7.580S, 7.590G, and 7.590R.

NUMBER INSTALLED TO DATE: Approximately 2,000 (including old model line).

DATA FORMATS

BASIC UNIT: An 8-bit byte. Each byte can represent one alphanumeric character, two BCD digits, or eight binary bits; two bytes represent a 16-bit half-word; four bytes represent a 32-bit word, and eight bytes represent a 64-bit double word.

FIXED-POINT OPERANDS: A 16-bit half-word can represent a 16-bit signed integer; while a 32-bit word can represent a 31-bit signed integer or a 32-bit unsigned binary value.

FLOATING-POINT OPERANDS: A 32-bit 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 64-bit double word with a 7-bit characteristic and a 56-bit mantissa. For extended floating-point representation, a signed double precision format is available through the use of two 64-bit double words: seven bits of the first double word are used to represent the characteristic, and the remaining 56 bits of that double word plus 56 bits of the following double word are used to represent a 112-bit mantissa (28 hexadecimal or 34 decimal digits).

MAIN STORAGE

STORAGE TYPE: MOS 128K-bit chips.

CAPACITY: See Characteristics, Table 1.

CYCLE TIMES: See Characteristics, Table 1.

CHECKING: Memory protection, error detection, and single-bit error correction are standard on all models. Microprograms continuously perform checking. Automatic instruction retry is standard on all models. The control memory, the registers, and all data paths are subject to parity checking. All the data in the memory is checked by an 8-bit Hamming code. One bit errors are corrected while multiple-bit errors are noted. There are also error recovery routines built into the BS2000 operating system. Detailed information (four error words) concerning detected machine errors and the internal status of the machine at the time the error was detected is logged automatically by the hardware and stored in main memory.

STORAGE PROTECTION: A main memory access controller provides both read and write protection and prevents unauthorized access to main memory or modification of the main memory contents. Storage protection is implemented by dividing main memory into 2K-byte blocks and assigning a 5-bit storage key to each block. Four of these bits specify the actual protection key for a specific block. The fifth bit determines whether the memory block is to be protected only ▶

Siemens 7.500 Series

TABLE 1. CHARACTERISTICS OF SYSTEM 7.500

MODEL	7.530B	7.530C	7.530D	7.530F	7.530H	7.550B	7.550D	7.550N	7.536-20	7.560E	7.560F
MAIN MEMORY											
Read cycle time, ns per 8 bytes	610	—	610	610	—	NA	NA	NA	—	—	—
Minimum capacity, MB	2	4	4	4	4	2	2	4	2	8	8
Maximum capacity, MB	6	8	8	8	8	12	12	16	8	16	16
Increments, MB	2	2	2	2	2	2,4	2,4	2,4	2	4	4
CACHE MEMORY											
Capacity, KB	—	—	—	16	16	16	16	32	—	64	64
Read cycle time, ns per 8 bytes	—	—	—	84	—	84	84	84	—	—	—
PROCESSING UNIT											
Machine cycle time, ns	84 - 126	—	84 - 126	84 - 126	—	84 - 126	84- 126	84- 126	—	—	—
Number of I/O processors	1	1	1	1	1	1	1	1-2	1	1	1
Central processing unit	1	1	1	1	1	1	1	2	1	1	1
Arithmetic unit	—	—	—	—	—	—	—	—	—	—	—
Direct channels for disk storage	1	—	0-2	0-2	—	—	—	—	—	—	—
Aggregate data rate M bps	5	11	11	11	11	12	12	20	6	16	16
BYTE-MULTIPLEXER CHANNEL											
Number	1	1	1	1	1	1	1	2	1	1	1
Number of trunks available/ channel	1-5	—	1-9	1-13	—	7-15	7-15	7-22	—	—	—
Data rate, K bps	350	—	350	350	—	450	450	450	—	—	—
BLOCK-MULTIPLEXER CHANNEL											
Number	—	0-2	0-2	0-2	0-2	2-6	3-7	3-10	2-3	3-7	3-7
Number of trunks available/ channel	—	—	1	1	—	2	2	2	—	—	—
Data rate, M bps	—	—	2	2	—	2	2	2	—	—	—
Disk controller paths	—	—	—	—	—	16	16	16	—	—	—
Integrated disk controller paths	1	—	2	2	—	—	—	—	—	—	—

NA—Not available.

▷ longer perform this function. The 7.570-P, 7.580-S, and 7.590-R can support a second central console through a second input/output processor. Up to three subconsoles can be attached to the central operator console at distances of up to two kilometers.

There are six exchangeable disk drives ranging in capacity from 63MB to 60GB. Only one 125MB drive can be connected to the 7.530, while all other exchangeable drives can be used with any 7.500 model.

Fifteen magnetic tape units (800, 1600, or 6250 bpi) have read/write speeds ranging from 20K to 1250K bytes per second depending upon model and density used. Units with a recording density of 6250 bpi and read/write speeds of 780 to 1250 bytes per second can be attached only to Models 7.550 and 7.570.

There are four impact printers available with speeds ranging from 600 to 2,000 lines per minute, depending on model and character set. A 21,000 lpm laser printer is also available.

Other peripherals include the 3257 Document Reader-/Sorter, card readers (80-column cards) with a reading rate of 660 or 1,000 cards per minute and card punches operating between 100 and 300 cards per minute. There is also a 90-column card option. ▷

▶ against write accesses or against read and write accesses from other programs. Program authorization to access main memory takes the form of a 4-bit user key that enables protection of up to 15 concurrent programs.

In the virtual memory mode, memory protection is implemented by a 4-level ring protection scheme. Each ring is assigned one 2-bit number for read accesses and another for write accesses; these numbers define the address space to which the ring belongs. A 2-bit ring state indicator indicates the ring levels that can be accessed.

CENTRAL PROCESSORS

The 7.530 and the 7.550 use the same 32-bit central processing unit, while the 7.570 incorporates a faster 32-bit CPU. (See Table 1 for cycle times.) The two processors are compatible.

The 7.560 CPUs are single-processor models with 8MB to 32MB of RAM. The 7.570 CPUs can be field-enhanced from the single-processor Model-B to the more powerful Models-C and -G through to the dual-CPU Model-P with up to four I/O processors. The 7.590 CPUs represent the top end of the 7.500 range. The single-processor Model-G can be field enhanced to the dual-CPU Model-R.

The CPUs have fixed-point, floating-point, and decimal arithmetic facilities. Each has a time-of-the-day clock, an elapsed-time clock, an internal timer, and three program timers. Memory protection, automatic error detection and recovery, auto instruction retry, dynamic address translation, and a byte-multiplexer channel are all standard. ▶

Siemens 7.500 Series

TABLE 1. CHARACTERISTICS OF SYSTEM 7.500 (Continued)

MODEL	7.560H	7.570B	7.570C	7.570G	7.570P	7.580D	7.580E	7.580I	7.580S	7.590G	7.590R
MAIN MEMORY											
Read cycle time, ns per 8 bytes	—	NA	NA	NA	NA	—	—	—	—	—	—
Minimum capacity, MB	8	4	8	8	16	8	8	16	32	14	32
Maximum capacity, MB	16	16	32	32	64	32	32	64	128	64	128
Increments, MB	8	4	4,8	4,8	8,16	8	8	8-16	16-32	—	—
CACHE MEMORY											
Capacity, KB	64	32	32	64	128	64	64	64	2X64	23	46
Read cycle time, ns per 8 bytes	—	52	52	52	52	—	—	—	—	—	—
PROCESSING UNIT											
Machine cycle time, ns	—	52	52	52	52	—	—	—	—	—	—
Number of I/O processors	1	1-2	1-2	1-2	2-4	1	1	1	4	1	—
Central processing unit	1	1	1	1	2	1	1	1	2	—	2
Arithmetic unit	—	—	0-1	1	2	—	—	—	—	—	—
Direct channels for disk storage	—	—	—	—	—	—	—	—	—	—	—
Aggregate data rate M bps	16	32	32	32	40	—	16/32	—	32/64	72	144
BYTE-MULTIPLEXER CHANNEL											
Number	1	2	2	2	4	1	1	1	1	23	46
Number of trunks available/ channel	—	15	22	22	15	—	—	—	—	—	—
Data rate, K bps	—	450	450	450	450	—	—	—	—	—	—
BLOCK-MULTIPLEXER CHANNEL											
Number	3-7	14	20	20	28	3	3	3	3	6	12
Number of trunks available/ channel	—	2	2	2	2	—	—	—	—	—	—
Data rate, M bps	—	2	2	2	2	—	—	—	—	—	—
Disk controller paths	—	16	16	16	32	—	—	—	—	—	—
Integrated disk controller paths	—	—	—	—	—	—	—	—	—	—	—

NA—Not available.

▷ The BS2000 operating system provides an interface that allows users to operate the system with a set of some 20 commands and controls all important functions with the help of an additional 30 commands.

An innovative training system called "Teachware" familiarizes operators and users with the BS2000 commands. Programmed instructions enable those who are already familiar with computer systems to teach themselves, via an integrated video terminal, about the System 7.500 and BS2000.

The complete BS2000, with approximately two million instructions, supports all types of operations; i.e., timesharing, transaction processing, and local and/or remote batch processing. It has been designed to cover the entire computer performance range. On the smaller models, BS2000 is customized to meet the exact requirements of the configuration ordered. All 7.500 models permit the customer to choose at system generation the amount of virtual memory per user (one to four megabytes). From a programmer's viewpoint, a major advantage of the BS2000 is its uniform command language in all modes and at all levels of operation.

Compilers are available for Cobol, Fortran, PL/1, SPL, Basic, APL, Algol, Pascal, and RPG II. Programs can also be written in Assembler. ▷

▶ With the exception of the 7.570-P, all models have one central operator console for operator system dialog. This console contains a color VDU and a system printer. The dual-processor 7.570-P permits system operation via two central operator consoles, each capable of supporting a console printer for logging, a diskette drive for I/O or user data, and up to three subconsoles with screen, keyboard, and optional printer. Model 7.550 is also available in a dual-processor version, the 7.550-N.

All models have virtual addressing capabilities with dynamic address translation. A working space of up to 8 or 16 megabytes is available to each user, depending on the model.

SERVICE PROCESSOR: An integral part of the central operator console is the service processor (SVP). This separately powered subsystem is made up of a microprocessor with a 64KB main memory and two diskettes (one for the system and one for maintenance) and is housed in the central operator console. The SVP connects to the central processor and the I/O processors via a special interface.

All local maintenance procedures and diagnostic routines are carried out by the SVP, which is also responsible for editing error information, producing messages in clear text, and supporting error recovery when a component malfunctions or the operating system can no longer perform this task. Remote maintenance is facilitated via the 3026-2 console.

INSTRUCTION REPERTOIRE: The System 7.500 processors all employ the full 7.700 Series set of 169 instructions, including facilities for processing variable length, decimal, and fixed-point binary operands. The floating-point instructions provide single, double, and extended pre- ▶

Siemens 7.500 Series

▷ System 7.500 software tools, application software packages, and the database/data communications management tools are priced separately.

Via the System 7.500, Siemens is promoting the concept of the "development computer," a problem-solving approach aimed at improving software development productivity during analysis, design, implementation, and maintenance. Emphasis is on interactive programming and on providing programming hardware at the actual workplace of the engineer, designer, or programmer. Tools available to facilitate software development and maintenance are BYBLOS (design and documentation); Colombus (structured programming); Testmanager and MMS (test and measurement); FMS and David (file management); Cotune and Fortune (program run analysis); GPSP (macroprocessor); Formplag (editing and checking terminal input); and Doculity (test editing).

Siemens believes that delegating software development tasks to a separate, relatively low-cost compact computer guarantees independence from computer-center operations, provides constant availability, and removes the development burden from the production operation.

For the System 7.500, existing data management systems such as the Universal Database Management Systems (UDS) and SESAM are available in a "compact" release.

A wide range of applications packages is available on the System 7.500 for general commercial applications such as accounting, personnel management, purchasing, warehousing, order processing, and manufacturing. Other packages include DIFIB (interactive accounting), Comet (a system for corporate decision-making), ISI (industrial planning and control), Trafic (transport optimization and vehicle fleet schedule), Sinet (interactive system for network analysis), GPSS and SICOS (simulation of models with discrete and continuous operations), and Methaplan (methods base).

COMPETITIVE POSITION

Since the computer market is far from homogeneous throughout Europe, the Siemens 7.500 faces competition from various vendors. However, the main competitor is IBM, the industry leader. As it has always done, Siemens is following its usual marketing strategy of matching models against IBM.

Originally announced as Siemens' answer to IBM's 4300 Series, the 7.500 now competes with both the 4300 and 303X Series. The three 7.530 models compete against the IBM 4331 and 4361; the 7.550 competes against the 4361 and 4381; and the top-end 7.570 is comparable with the 4381 and 308X.

Always conscious of IBM and the various IBM plug-compatible mainframes, Siemens intends to increase market share by attracting potential customers of Honeywell's DPS 7 and DPS 8 as well as potential customers of Sperry's 1100/60 and 1100/80 Series. The range also faces increas- ▷

▶ cision. Extended-precision instructions handle operands with a 112-bit mantissa (28 hexadecimal or 34 decimal digits) while double precision floating-point instructions handle operands with a 56-bit mantissa. The breakdown of the 169 instructions is as follows: 13 privileged, 21 data transfer, 8 branch, 13 logical, 14 binary, 22 fixed-point, 11 decimal, 51 floating-point, 3 stack, 4 edit, and 9 miscellaneous.

INDIRECT ADDRESSING: Yes.

DYNAMIC ADDRESS TRANSLATION: Virtual addresses of active pages are converted to corresponding real addresses by means of a 2-level translation system based on 2K-byte pages and 32-page (64K) segments. If there is no hit in the Address Translation Memory (ATM), the search continues in the segment and page tables stored in main memory.

The Address Translation Memory (ATM) guarantees a first level hit in the search for a page in 90 to 95 percent of all cases under normal program conditions.

To execute the address translation, a row in the ATM is selected by means of parts of the segment and page portions of the virtual address. The entries in the ATM can be addressed by these bits because the pages have fixed locations. When an entry has been retrieved, a comparison is made between portions of the virtual address and the entry in the ATM. If they match, it results in the real page number, which forms the real address together with the displacement from the virtual address. If they do not match, the segment and page tables in main memory are used. The segment tables define each user's virtual memory allocation and contain one entry for each segment. The entries in the segment table refer to the real memory address in the page tables. The page tables in turn indicate the pages which are currently located in the real memory. Each segment has an associated page table. Since the channels contain no address translation hardware, the operating system automatically translates virtual addresses embedded in the channel commands before the I/O operations are performed.

REGISTERS: There are no index registers; but there are forty-three 4-byte, general-purpose registers that can be used for base and index register functions in address computations, for transferring addresses, or for holding operands in binary and logical operations. In addition, a number of special-purpose registers are provided.

For some instructions, two adjacent 4-byte general registers are combined to form an 8-byte field. Other instructions can reference up to 16 general registers at one time.

Four 8-byte registers for floating-point calculations are also provided. These registers can hold either a short 4-byte or a long 8-byte, floating-point number. The short floating-point number is contained in the four high-order bytes of the register: in order to accommodate extended floating-point numbers, two registers can be paired to form a 16-byte field.

Three 32-bit control registers are used to contain processor control information: the Program Counter Register (PCR); the Interrupt Status Register (ISR); and the Interrupt Mask Register (IMR). These registers can be altered only by privileged instructions in the system state.

CACHE MEMORY: The CPUs of all models, except the 7.530-B and 7.530-D, contain a high-speed cache memory between main memory and the processor. Its function is to buffer instructions and data prior to processing. During each read operation required by the central processor, a check is made to determine if the addressed item of information is present in the cache. ▶

Siemens 7.500 Series

▷ ing competition from Japanese-based models such as the BASF 7/60 and 7/70. Other competition comes from the many manufacturers who produce workstation-oriented systems incorporating advanced technology in the form of microprocessor-controlled input/output processors. These manufacturers include ICL, Ericsson, Digital Equipment Corporation, Data General and many microcomputer vendors.

The 7.500 is marketed in the European countries of Austria, Belgium, Denmark, France, Italy, The Netherlands, Spain, Sweden, and Switzerland; as well as in South Africa.

ADVANTAGES AND RESTRICTIONS

The principal advantage of the Siemens 7.500 System is the scope of the range. Its 22 models can cover data processing needs ranging from simple office requirements to complex scientific processing. Since all of the models are completely compatible with one another, users are assured of a smooth migration path. The uniformity of the BS2000 operating system throughout the range also protects users' investments.

Throughout the years since its introduction, Siemens has carefully monitored the growth of the 7.500 Series, adding new models when necessary and constantly improving performance over previous models. The firm has also increased the main memory of the series and increased cache memory capacity, as well as enhancing input/output channels. Siemens' reputation for quality is evident throughout the 7.500 Series.

The incorporation of a service processor into the models facilitates maintenance tasks and provides error recovery support in the event of a malfunctioning component.

Siemens considers data security extremely important and has provided a number of ways to protect data and the system. Terminals can be locked by a keyboard switch and can be protected by a badge reader against unauthorized use. In addition, the operating system prevents unauthorized access by making operators identify themselves with an identification code. Another feature prevents memory accesses outside the address space for a particular task and prevents unauthorized access to disk files. A check is made of the user group, user name, and password before a user can have access to data in the database.

A hierarchical system of data permits classification of users so that some have access to all data, while others have access to only some of the data. Siemens has thus provided an extremely flexible and versatile security system with the 7.500 Series.

A wide variety of software is offered for the 7.500 Series. Of particular interest is the Transdata System, a data communications package that can be adapted to individual installations. The versatility of the Transdata System is evident in its range of applications which cover local connections, public networks, line concentration, decentralized data processing, and distributed processing in complex networks. ▷

▶ All 7.570 models have a write buffer, containing 8KB of memory in Models-B, -C, and -G, and 16KB in the 7.570-P.

CONTROL MEMORY: On all models, the control memory stores microprograms for controlling the CPU and I/O processor and provides buffers for the channel and function registers. The control memories of the processors are loaded from the shadow memory on demand.

SHADOW MEMORY: A reserved part of main memory, this area is used to store microprograms for all components of the CPU and to store information on connected peripherals for the I/O processor. Shadow memory is loaded from the diskette drive and also stores information on machine errors, error logout data, and diagnostic routines. Inaccessible to the user, shadow memory occupies about 130K bytes, depending on the system configuration. Each additional 32 attached peripherals require an additional 2K bytes of shadow memory.

OPERATIONAL MODES: There are four processor states:

P1 = Processing State
P2 = Interrupt Response State
P3 = Interrupt Control State
P4 = Machine Condition State

In P1 and P2, user programs and program interrupts are processed; and in P3 and P4, program interrupts are analyzed. Each processor state has its own set of general and control registers that function independently of other processor states. All the timers run in P1 and P2; the interval timer and the program timers are deactivated for P3 and P4.

COMPATIBILITY FEATURES: The System 7.500 includes a subset of all 7.700 instructions, making the systems source code compatible. Because of the high degree of compatibility between the 7.700 and the IBM 360/370, a relatively simple conversion is possible at the source language level between these IBM systems and the 7.500 Series.

PHYSICAL SPECIFICATIONS: The central unit of the three 7.530 models measures 180 by 118 by 83.2 cm³ (height x width x depth) and weighs approximately 500 kg.

The central units of the 7.550-B and 7.550-D are housed in cabinets of the same size as the 7.530, but which weigh 550 kg. The 7.550-N measures 180 by 191 by 83.2 cm³ and weighs 900 kg.

If the 7.530 and 7.550 units are not standing on a ventilated floor, a base is needed which increases the height of the cabinet by 8 cm.

The 7.570-B, 7.570-C, and 7.570-G central units measure 180 by 231 by 83.2 cm³. The -B weighs between 1,050 and 1,200 kg, depending upon the configuration, while the -C and -G can vary in weight from 1,050 kg to 1,500 kg. The 7.570P measures 180 by 417 by 83.2 cm³ and can weigh between 2,100 and 2,700 kg.

I/O CHANNELS: The 7.530-B features one integrated channel, one byte-multiplexer channel (BYMUX), and a disk storage adaptor. The 7.530-D and -F can each have either two channels with disk storage adaptors, or two block-multiplexer channels (BLMUX), in addition to one BYMUX. Direct channels are not supported in the 7.550 and 7.570, which each support at least one BYMUX and two BLMUXs. (For exact number of channels, see Table 1.)

The 7.580 models contain one BYMUX channel with eight ports each and three BLMUX channels with two ports each. The Model 7.590-G contains a maximum of 23 BLMUX ▶

Siemens 7.500 Series

> USER RATINGS

Our most recent report on *German User Ratings of Main-frames* included responses from 83 users of the 7.500 Series. The responses were categorized by the following models: 7.531, 7.536, 7.541, 7.551, and 7.5XX Other Models.

Sixty-three users did not intend to replace their systems during 1983; twelve planned to replace the system with another from Siemens; one intended to move to another vendor; and three hoped to replace their systems, but had not decided upon the vendor.

The following tables list the ratings for each of these models.

Siemens 7.531 (13 users)

	Weighted Average
Ease of Operation	2.77
Reliability of Mainframe	3.00
Reliability of Peripherals	2.92
Maintenance Service	
Responsiveness	2.62
Effectiveness	2.62
Technical Support	
Troubleshooting	2.25
Education	2.45
Documentation	2.45
Manufacturer's Software	
Operating System	2.92
Compilers & Assemblers	3.08
Applications Programs	2.78
Ease of Programming	2.83
Ease of Conversion	2.75
Overall Satisfaction	2.92

Siemens 7.536 (32 users)

	Weighted Average
Ease of Operation	3.13
Reliability of Mainframe	3.53
Reliability of Peripherals	2.97
Maintenance Service	
Responsiveness	2.97
Effectiveness	2.74
Technical Support	
Troubleshooting	2.59
Education	2.69
Documentation	2.63
Manufacturer's Software	
Operating System	3.34
Compilers & Assemblers	2.94
Applications Programs	2.74
Ease of Programming	2.84
Ease of Conversion	2.75
Overall Satisfaction	2.97

> and six BYMUX channels, while the 7.590-R contains a maximum of 46 BLMUX channels and 12 BYMUX channels.

The transfer rate of an individual byte-multiplexer trunk varies from 350KB per second to 450KB per second depending on whether the channel is operating in multiplex or selector mode. In multiplex mode, several devices can share the same trunk, while in selector mode, only one I/O device can use a trunk. I/O devices attached to individual byte-multiplexer channel trunks can simultaneously perform I/O operations as long as the aggregate data rate is not surpassed.

Disk drives connect to the 75214 or 75314 disk storage adapter (DDSA). One DDSA is standard on the 7.530-B, and two can optionally be fitted to the 7.530-D and 7.530-F. Fixed and exchangeable disk drives can be connected to the DDSA which has a data rate of 806KB per second.

3026-2 CENTRAL OPERATOR CONSOLE: This console includes a video terminal (24 lines plus one status line, 80 characters per line), control panel, keyboard, and a Service Processor, which has two diskette drives for IPL, diagnostic IPL, monitoring, reconfiguration of the system, and remote maintenance. The 30262 console printer and the 30263 diskette unit can be attached. Three 3026-10 subconsoles can be attached to the central operator console at a maximum distance of two kilometers.

The 3026-3 can be attached at a distance of up to 50 meters from the -2 consoles. Up to three 3026-10 subconsoles with monitor screen, keyboard, and optional printer are supported by the 3026-3.

3026-10 SUBCONSOLE: This console includes a video terminal (24 lines plus one status line, 80 characters per line), a keyboard, and a control panel. The 30262 console printer (90 characters per second) can be attached optionally.

3027-1 LOCAL OPERATOR CONSOLE: It includes a VDU with detached keyboard, display format, and two status and up to 23 dialog lines. It can be connected to a console printer and ID card reader. The unit also contains 25-by-80 character positions, and 19,200 bps maximum transfer rate, and connects to the Models 7.530, 7.536-20, 7.550, and 7.570.

3027-11 LOCAL COLOR-VDU OPERATOR CONSOLE: This is the same as the 3027-1, but is equipped with a color character display.

3027-2 REMOTE OPERATOR CONSOLE: This is the same as 3027-1, but connects via public telephone lines and data communications equipment (DCE). Maximum line length to DCE is 30 m. The data transfer rate is 1200 or 2400 bps.

3027-21 REMOTE COLOR-VDU OPERATOR CONSOLE: This is the same as the 3027-2, but has the same color character display as the 3027-11.

TELEPROCESSING

All models of the System 7.500 support teleprocessing operations. The 7.530 and 7.550 include an Integrated Front-End Processor (IFEP) through which the machine is connected to the Transdata 960 Communication Computer System comprising 968X front-end processors, 967X remote front-end processors, and 966X terminal computers. The 7.570 models are connected directly into the Transdata system.

Siemens 7.500 Series

▷ **Siemens 7.541** (18 users)

	Weighted Average
Ease of Operation	3.00
Reliability of Mainframe	3.44
Reliability of Peripherals	3.17
Maintenance Service	
Responsiveness	3.17
Effectiveness	2.89
Technical Support	
Troubleshooting	2.72
Education	2.94
Documentation	2.67
Manufacturer's Software	
Operating System	3.11
Compilers & Assemblers	3.06
Applications Programs	2.71
Ease of Programming	2.71
Ease of Conversion	2.88
Overall Satisfaction	2.89

Siemens 7.551 (15 users)

	Weighted Average
Ease of Operation	2.87
Reliability of Mainframe	3.40
Reliability of Peripherals	2.80
Maintenance Service	
Responsiveness	2.67
Effectiveness	2.53
Technical Support	
Troubleshooting	2.50
Education	2.47
Documentation	2.27
Manufacturer's Software	
Operating System	3.20
Compilers & Assemblers	2.93
Applications Programs	2.67
Ease of Programming	2.64
Ease of Conversion	2.57
Overall Satisfaction	2.73

Siemens 7.5XX Other Models (5 users)

	Weighted Average
Ease of Operation	3.25
Reliability of Mainframe	3.75
Reliability of Peripherals	3.50
Maintenance Service	
Responsiveness	3.00
Effectiveness	3.25
Technical Support	
Troubleshooting	3.00
Education	3.00
Documentation	3.00
Manufacturer's Software	
Operating System	3.75
Compilers & Assemblers	2.75
Applications Programs	2.33
Ease of Programming	2.75
Ease of Conversion	3.00
Overall Satisfaction	3.00 □

▶ Control software consists of the Transdata PDN (Program System for Teleprocessing and Network Control) operating system and the DCM (Data Communications Method) access system. The Transdata system makes message-handling transparent to the user. The Transdata System is a data communications package that can be tailored to an individual company's needs. The Transdata scheme is divided into five spheres of use: local connections, public networks, line concentration, decentralized data processing, and distributed processing in complex networks.

Transdata terminal computers can be programmed in APS (Application Programming System) or in Cobol 9600, a subset of the System 7.500 Cobol.

The complete range of Transdata BS2000 devices is supported by all 7.500 systems. Network modules include data transmission facilities, Model 8901/2/3 concentrators, and Model 8906 interface expanders. Terminal subsystems that can be supported include the Model 810 terminal system with data display terminals, cluster controllers, and printers such as the Model 8112 printer terminal, and the Model 970 terminal system with both terminals and printer terminals.

75309-1 IFEP: Standard on the 7.530. The basic model has eight local terminal ports and one remote HDLC port for connection to networks, including DATEX-L and DATEX-P. The extended IFEP contains 32 local terminal ports and four remote ports which can support the HDLC, MSV1, MSV2, and LSV1 protocols.

75369 IFEP: Standard on the 7.550. The basic model contains 256KB of MOS memory, expandable to 512KB; four local terminal ports; and one remote HDLC port. Up to 32 local terminal ports and/or 11 remote ports can be supported by the 75369.

CONFIGURATION RULES

7.530 MODELS: The 7.530 is available in three versions, the 7.530-B, 7.530-D, and 7.530-F. Each model can support a maximum of 256 tasks (including system tasks). Field-upgrading is possible between all models.

The 7.530-B in its basic configuration contains 2MB of main memory; one operator console; one byte-multiplexer channel (BYMUX) with one trunk; one direct storage adaptor (DDSA); and one printer port. Main memory can be extended to 6MB, four extension trunks can be added to the BYMUX, and four magnetic tape drives can be supported by the system.

The basic 7.530-D has 4MB of main memory, one operator console, and one BYMUX with one trunk. Unlike the -B, the -D can support two block multiplexer channels (BLMUXs), each with one trunk, and is only optionally fitted with one or two DDSAs. Main memory on the 7.530-D can be increased to 8MB; two magnetic tape ports supporting eight units, and two printer ports can be added to the model. The BYMUX can support up to nine trunks.

The 7.530-F is similar to the -D in that it has a basic main memory of 4MB, expandable to 8MB; one BYMUX and two BLMUXs; and two optional DDSAs; magnetic tape ports and printer ports. The -F additionally contains 16KB of cache memory and can support 13 trunks through the BYMUX.

7.550 MODELS: The 7.550-B, 7.550-D, and 7.550-N form the 7.550 systems. Each model contains a cache buffer in addition to main memory. Up to 240 users can work concurrently on each model. There is field-upgradability between the three models.

The 7.550-B comprises 2MB of main memory and 16KB of cache memory, one operator console, an I/O processor, one ▶

MAY 1986

Siemens 7.500 Series

▶ BYMUX with seven trunks, and two 2-trunk BLMUXs. Expansion possibilities include increasing main memory to 12MB, the addition of a further eight BYMUX trunks, and the addition of up to four extra BLMUXs.

The 7.550-D in its basic configuration contains 2MB of main memory, 16KB of cache memory, one operator console, one I/O processor, one BYMUX with seven trunks, and three 2-trunk BLMUXs. Main memory can be extended to 12MB. Up to 15 trunks can be used by the BYMUX, and a total of seven BLMUXs can be supported by the Model-D.

The 7.550-N is a dyadic processor with two central processors, each containing 16KB of cache storage and a total basic main memory of 4MB. There is one operator console, one I/O processor, one BYMUX with seven trunks, and three 2-trunk BLMUXs. The extended Model-N contains 16MB of main memory, a second I/O processor, a second BYMUX, and seven additional BLMUXs.

7.570 MODELS: There are four models within the 7.570 processor system, and each contains a cache buffer, a write buffer, and an operator console. The 7.570, like the 7.530 and 7.550, can support 256 tasks.

The basic 7.570-B has 4MB of main memory, 32KB cache memory, an 8KB write buffer, one I/O processor, one BYMUX with fifteen trunks, and seven 2-trunk BLMUXs. Main memory can be expanded to 16MB and a second I/O processor can be added to the system. The second processor has one BYMUX with seven trunks and three 2-trunk BLMUXs, but this can be increased to a maximum of 15 BYMUX trunks and 7 BLMUXs.

The 7.570-C in its basic configuration contains 8MB of main memory, 32KB cache memory, an 8KB write buffer, and one I/O processor which, as with the Model-B, supports one BYMUX and seven BLMUXs. The optional second I/O processor in the extended version supports one BYMUX with fifteen trunks and seven 2-trunk BLMUXs. Further I/O expansion is possible with the Model-C, and involves the addition, to each processor, of a further eight BYMUX trunks and three BLMUXs.

The 7.570-G is similar to the Model-C, containing the same main memory, and write buffer capacity. Cache memory, however, is 64KB. The Model-G can support one or two I/O processors, each containing one BYMUX with 15 trunks and seven 2-trunk BLMUXs. Input/output extension is possible with the addition, to each processor, of eight extra BYMUX trunks and three BLMUXs.

The 7.570-P is a dyadic processor system, comprising two central processing units, two service processors, and two operator consoles. Main memory extends from 16MB to 64MB, the cache memory capacity is 128KB, and the write buffer contains a total of 16KB of memory. The basic Model-P includes two I/O processors, each with one BYMUX with 15 trunks, and seven 2-trunk BLMUXs. Up to four I/O processors can be supported by the -P, giving a maximum of four BYMUXs and 28 BLMUXs.

7.560 MODELS: There are three models within the 7.560 processor system that contain a cache memory. The 7.560-E and 7.560-F contain 8MB of main memory, expandable to 16MB; a 64KB cache memory; one I/O processor; one BYMUX channel; and three to seven available BLMUX trunks.

The 7.560-H contains 6MB of main memory, expandable to 32MB; 64MB of cache memory; one I/O processor; one BYMUX channel; and three to seven BLMUX trunks.

7.580 MODELS: There are four models in the 7.580 processor line that contain write memories, private-line main memories, and private cache memories.

The 7.580-D contains one I/O processor, 8-, 16-, 24-, or 32KB of main memory, a 64KB private cache memory, one BYMUX channel with 8 ports, and three BLMUX channels with two ports each.

The 7.580-E contains one I/O processor, 8-, 16-, 24-, or 32KB of main memory, an 8KB write memory, 64KB private cache memory, one BYMUX channel with 8 ports, and three BLMUX channels with two ports.

The 7.580-I contains one I/O processor, 16-, 24-, 32-, 48-, or 64KB of main memory, an 8KB write memory, 256KB private main memory, 64KB private cache memory, one BYMUX channel, and three BLMUX channels.

The 7.580-S has four I/O processors and two CPUs, 32-, 48-, 64-, 96-, or 128MB of main memory, two 256KB private main memory arrays, two 64KB private cache memories, one BYMUX channel, and one BLMUX channel.

7.590 MODELS: There are two models in the powerful 7.590 processor system that contain global buffers and private cache memories.

The 7.590-G contains one I/O processor, 14-, 24-, 32-, 48-, or 64MB of main memory, a 512KB global buffer, 23KB private cache memory, a maximum of 23 BLMUX channels, and a maximum of six BYMUX channels.

The 7.590-R contains two central processing units, 32-, 48-, 64-, 96-, or 128MB of main memory, two 512KB global buffers, a 46KB private cache memory, a maximum of 46 BLMUX channels, and a maximum of 12 BYMUX channels.

MASS STORAGE

For the number of disk units that can be attached to each model, see the Characteristics Table 1.

Disk drives are connected into the system via the disk storage adaptor on the 7.530-B, the disk storage adaptor or disk controllers on Models 7.530-D and 7.530-F, and via disk controllers only on all 7.550 and 7.570 models.

FIXED DISK DRIVES

3432 DISK DRIVE: For use with the 7.530. The 3432 has a net capacity of 126MB. Average access time is 30 ms and the data transfer rate is 1.2MB per second.

3433 DISK DRIVE: For use with the 7.530. The 3433 has a net capacity of 267MB. Average access time is 30 ms and the data transfer rate is 1.2MB per second.

3470 DISK DRIVE: For use with all models. The 3470 has a net capacity of 420MB. Average access time is 20 ms and the data transfer rate is 806KB per second. This drive is also available with the 7.700 Series.

3475 DISK DRIVE: For use with the 7.550 and 7.570. The 3475 has a net capacity of 756MB. Average access time is 18 ms and the data transfer rate is 1.8MB per second.

3480 DISK DRIVE: For use with the 7.550 and 7.570. The 3480 has a net capacity of 1.85GB. Average access time is 16 ms and the data transfer rate is 3MB per second.

EXCHANGEABLE DISK DRIVES

3431 DISK DRIVE: For use with the 7.530. The 3431 has a net capacity of 63MB. Average access time is 30 ms and the data transfer rate is 1.2MB per second. ▶

Siemens 7.500 Series

▶ **3454 DISK DRIVE:** For use with all models. The 3454 has a net capacity of 63MB. Average access time is 37.5 ms and the data transfer rate is 806KB per second.

3464 DISK DRIVE: For use with all models. The 3464 has a net capacity of 126MB. Average access time is 37.5 ms and the data transfer rate is 806KB per second.

3468 DISK DRIVE: For use with all models. The 3468 has a net capacity of 267MB. Average access time is 40.5 ms and the data transfer rate is 806KB per second. This drive is also available with the 7.700 Series.

3170 DISKETTE I/O UNIT: This unit is a peripheral device for the Siemens System 4004 (Models/35 to /151) 7.500 and 7.700. Connected via a byte- or block-multiplexer channel or selector channel, it enables the computer to read and write diskettes.

Apart from the standard disk initialization, as used in the Transdata 920 Diskette Data Entry System, diskettes can also be initialized and processed with variable formats on the 3170. Thus it is possible via the 3170 Diskette I/O Unit to read data stored by various systems on diskettes into a Siemens System 4004 or 7.700 computer.

The basic 3170 consists of one I/O station. This unit can be field-upgraded with an expansion feature to include a second I/O station. Each I/O station has a 4096-byte buffer for data storage of one complete track as standard and a stacker capacity of 17 diskettes. Feed, alignment, and stacking of the diskettes are fully automatic.

The controller is microprogrammed and consists of a fast bipolar LSI microprocessor. The data medium has a standard storage capacity of 1,898 records of up to 128 bytes each. A single diskette can store a maximum of 19 independent files. A variable block length feature enables records to be written in multiple lengths of 128 bytes to a maximum of 4096 bytes (corresponding to a 26 down one sector per track).

The maximum reading rate is 4,680 records per minute (standard format), and the maximum writing rate is 3,120 records per minute (standard format).

Rotational speed of the 3170 is 360 rpm, with a recording density of 3200 bpi, and an average access time of 242 ms. Data is organized into 77 tracks consisting of 74 data tracks plus three spares. In standard format, there are 26 sectors per track and 128 bytes per sector to give a maximum disk capacity of 242,272 bytes. In variable format there can be 26, 15, 8, 4, 2, or 1 sectors per track and 128, 256, 512, 1024, 2048, or 4096 bytes per sector to give a maximum disk capacity of about 245K to 303K bytes.

Options for the 3170 include the 31701 Floppy Disk Initialization feature to enable program-controlled initialization of diskettes in accordance with the ECMA proposed standard; the 31702 Variable Block Length feature to enable processing of variable block lengths; and the 31703 Dual I/O Station Expansion feature that enables overlapped reading and writing on two I/O stations connected to one channel each.

MAGNETIC TAPE EQUIPMENT

There are 15 different magnetic tape units available for use with the System 7.500 models. All are 9-track units.

3535 AND 3536 MAGNETIC TAPE UNITS: These direct connection devices offer recording densities of 640 bytes per cm (1600 bpi—PE) and 2460 bytes per cm (6250 bpi—GCR) and read/write speeds of 40 or 80 K bps and 156 or 312 K bps, respectively, forward tape speeds of 0.64 and 1.27

meters per second, respectively, and rewind speeds of 4.8 meters per second.

3525 AND 3526 MAGNETIC TAPE UNITS: These units connect directly to the 3535 and 3536 MTUs, respectively, each adding one drive with the same characteristics as the 3535 and 3536 MTUs.

3521 MAGNETIC TAPE UNIT: This is a 9-track device that has recording densities of 320 bytes per cm (800 bpi) and 640 bytes per cm (1600 bpi), read/write speeds of 20 and 40 kilobytes per second, a rewind speed of 4.10 meters per second, and a forward tape speed of 0.635 meters per second. A 3511 magnetic tape controller with circuitry for four drives can optionally be incorporated into the 3521 housing.

3523 MAGNETIC TAPE UNIT: This drive is identical to the 3521 except that it has read/write speeds of 40 and 80 kilobytes per second and a forward tape speed of 1.27 meters per second.

3570 MAGNETIC TAPE UNIT: This is a 9-track device that has a recording density of 640 bytes per cm (1600 bpi), a read/write speed of 30 kilobytes per second, a rewind speed of 7.6 meters per second, and a forward tape speed of 0.48 meters per second. The 3570 MTU consists of two magnetic tape drives: the MT-controller, and the power supply. The 3570 connects directly and has control circuitry for up to four additional 3530 tape drives.

3571 MAGNETIC TAPE UNIT: This is a 9-track drive that has a recording density of 640 bytes per cm (1600 bpi), a read/write speed of 60 kilobytes per second, a rewind speed of 7.6 meters per second, and a forward tape speed of 0.95 meters per second. The 3751 MTU consists of two magnetic tape drives, the MT-controller, and the power supply. The 3751 connects directly and has control circuitry for up to four additional 3531 tape drives.

3530 MAGNETIC TAPE DEVICE: This drive is identical in characteristics to the 3570 except that it has no control circuitry. This device connects to the 3570 and shares its control circuitry and power supply.

3531 MAGNETIC TAPE DEVICE: This drive is identical in characteristics to the 3571 except that it has no control circuitry. This device connects to the 3571 and shares its control circuitry and power supply.

3540 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 60 (NRZ) or 120 (PE) kilobytes per second, a rewind speed of 5.7 meters per second, and a forward tape speed of 1.9 meters per second. The 3540 connects to a 3510-01, -02, -03, or -04 controller.

3550 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 120 (NRZ40) or 240 (PE) kilobytes per second, a rewind speed of 10.4 meters per second, and a forward tape speed of 3.8 meters per second. The 3550 connects to a 3510-01, -02, -03, or -04 controller.

3554 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 3554 connects to a 3512-01, -02, -03, or -04 controller.

3557 HIGH-DENSITY MAGNETIC DEVICE: This 9-track unit has a recording density of 640 (PE) or 2460 ▶

Siemens 7.500 Series

➤ (GCR) bytes per cm (1600 or 6250 bpi, respectively), a read/ write speed of 200 (PE) or 780 (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 3557s connect to a 3513 controller.

3559 HIGH-DENSITY MAGNETIC 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 tape speed of 5.1 meters per second. Up to eight 3559s connect to a 3513 controller.

OPERATOR CONSOLE: There are four consoles within the 3027 series.

3027-1: A 15-inch screen displays green characters on a black background. The screen contains 23 lines of 80 characters, giving 1,840 characters, in addition to 2 status lines. The international character set contains 95 characters. The low-profile keyboard comprises the typewriter key set, a separate numeric keypad, and 17 programmable keys. The 3027-1 is a local console which can be connected at a maximum distance of 30 meters from the central unit.

3027-2: The 3027-2 is similar to the 3027-1, but is a remote console.

3027-11: A color console which displays blue, green, red, white, and yellow characters on a 14-inch screen. The screen contains 1,840 characters. The keyboard is identical to that used in the 3027-1. The 3027-11 can be sited up to 30 meters from the central unit.

3027-21: The 3027-21 is similar to the 3027-11, but is a remote console.

Each operator console can support a console printer and an ID card reader.

The 30272-1 needle printer uses a 9-by-9 matrix to form characters. The print speed is 80 characters per second.

The 30272-2 ink-jet printer also uses a 9-by-9 dot matrix to form characters. The print speed is 150 characters per second.

PRINTERS

There are five line printers (including one with four models) which can be attached to the System 7.500 with speeds ranging from 600 lines per minute on the slowest printer to 21,000 lines per minute on the laser printer.

3336 PRINTER: This device uses a print drum and prints 136 characters per line using a character set of 64, 81, 82, or 96 characters. Using the 64-character drum, the print speed is 600 lines per minute; with the 81- or 82-character drum, the print speed is 533 lines per minute; and with the 96-character drum, the print speed is 436 lines per minute. Horizontal spacing is 10 characters per inch, and vertical spacing is six or eight lines per inch. The 3336 accepts standard rim-punched forms 102 mm (4 inches) to 425 mm (16.75 inches) in width. A paper tape vertical formatting unit is standard.

3338 PRINTER: This printer is a band printer that prints 136 characters per line using a 48-, 64-, or 96-character set. Print speeds are 1,500 lines per minute with the 48-character set, 1,200 lines per minute with the 64-character set, and 800 lines per minute with the 96-character set. Horizontal spacing is 10 characters per inch, and vertical spacing is 6 or 8 lines per inch. The 3338 can accept forms from 89 cm to 476 cm in width. International, Danish, French, French/

Dutch, German, Spanish, and Swedish character sets are available.

3340 PRINTER: This device is a chain-driven unit that can print either 136 or 160 characters per line, using a character set of 48, 64, or 106 characters. Using the 48-character chain, the print speed is 1,170 lines per minute; with the 64-character chain, the print speed is 960 lines per minute. Horizontal spacing is 10 characters per inch, and vertical spacing is six or eight lines per inch. Powered forms stacking and a forms feed are available as optional features 33401 and 33410, respectively. Forms feed is standard on Submodels -12 and -14.

Submodels 3340-11 and -12 have one forms feed and can accept forms from 52 to 555 mm in width. Submodels 3340-13 and -14 have two forms feeds and can accept forms from 52 to 471 mm in width on the first feed and 104 to 523 mm in width on the second feed. All of the printer submodels can format pages from 8 to 16 inches in length.

3343 PRINTER: This device is a chain-driven unit that can print either 132 or 136 characters per line, using a 48-, 64-, or 96-character set. Using the 48-character chain, the print speed is 2,000 lines per minute; with the 64-character chain, the print speed is 1,630 lines per minute. Horizontal spacing (print density) is 10 characters per inch, and vertical spacing is six or eight lines per inch. Powered forms stacking and a forms feeder are standard. The 3343 can accept forms from 102 to 508 mm in width, and can format pages from 8 to 14 inches in length.

3350 AND 3352 LASER PRINTER: This device is a laser-beam unit that can print 136, 163, or 204 characters per line, concurrently using up to four character sets from a loadable 128 (standard) or 255 (option 33522) character set plus the blank or space. Horizontal spacing (print density) is 10, 12, or 15 characters per inch; and vertical spacing is six, eight, or 12 lines per inch. Print speed is 10,500 lines per minute with a vertical spacing of six lines per inch; 14,000 lines per minute with a vertical spacing of eight lines per inch; and 21,000 lines per minute with a vertical spacing of 12 lines per inch. The 3352 can print up to 70,000 characters per second. Powered forms stacking and a forms feeder are standard.

The 3352 can accept forms from 165 to 400 mm in width and can format pages from 8 to 14 inches in length. Paper is advanced at a uniform speed of 0.74 m per second no matter how many lines are advanced at once.

The 3352 can print up to 255 copies of a page and suppress parts of the text in the first five copies. Line densities can be changed within a page and print densities within a line. Forms can be printed using the 33521 forms overlay facility.

The optional forms overlay feature can be incorporated to allow frequently printed data such as headings, footings, and logo-types to be printed on forms by projecting an image on the drum during the printing process.

PUNCHED CARD EQUIPMENT

There are three models of 80-column card readers and one 80-column card punch available for the System 7.500.

3150-01 CARD READER: This unit operates at 1000 cpm. The card input hopper can hold 1,200 cards, and two 1,200 card output stackers are used. Attachments for the 3150-01 include the 31501 Binary Read feature, the 31502 Ticket/ Stub Card feature, the 31503 Mark Read feature, the 31504 Automatic-End-of-File feature, and the 31505 90-column feature. ➤

Siemens 7.500 Series

3150-02 CARD READER: This unit differs from the 3150-01 only in its 3,000-card capacity input hopper.

3150-03 CARD READER: This unit operates at 660 cpm. The card input hopper can hold 1,200 cards, and two 1,200 card output stackers are used. Attachments include all of the optional features available for the 3150-01 or 3150-02 except the 31503 Mark Read feature.

3160 CARD PUNCH: This unit operates at 100 to 290 cpm, and has a 1,200-card input hopper and two 1,100-card output stackers. A 31601 binary punching feature is available as an option.

3257 DOCUMENT READER/SORTER: This unit can process up to 130,000 documents per minute for a document length of 105 mm or up to 110,000 documents per minute for a document length of 152 mm.

SOFTWARE

Software for the System 7.500 includes the BS2000 virtual memory operating system, nine language processors, data management systems, tools for software development, and a variety of application software packages.

BS2000 OPERATING SYSTEM: All System 7.500 models use BS2000 as their operating system. BS2000, a virtual memory operating system, was first introduced in December 1975. Since then it has been developed, improved, and enhanced to include the Transdata DCM communications access system for simplified programming of timesharing and batch operations. The version of BS2000 used on the 7.500 models lets first-time users operate the system using only 20 commands. Important functions can be utilized with the help of an additional 30 commands. This version of BS2000 also offers improved data/program security, online maintenance routines, a more efficient system/user interface, and "evening routines" that permit concurrently running programs to be synchronized so that data can easily be exchanged among them.

The essential features of BS2000 comprise dynamic memory management, concurrent support of local or remote batch processing, multiprocessing, and interactive processing (timesharing) for multiple users under control of a time-slice-oriented management system.

Under BS2000, 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. BS2000 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 BS2000: 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; and

• 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 SAM (Sequential Access Method), ISAM (Indexed Sequential Access Method), PAM (Primary Access Method), and BTAM (Basic Tape Access Method). PAM can access only 2048-byte pages.

The Teleprocessing System supports remote access to the computer system including facilities for resource management, logon/logoff, support of logical or virtual terminals, data transfer, and error handling.

System Services include an Interactive Debugging Aid, a Desk Calculator function, a Dynamic Linking Loader, and an Audit Mode for generation of branch address tables.

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 BS2000 is divided into two sections: one reserved for the Executive and the real memory resident programs, the other divided into 4K-page frames. All paging is done on demand only.

Virtual memory is subdivided into six classes. Classes 1 to 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 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 (400/151).

LANGUAGE PROCESSORS: Ten languages are available on the System 7.500. They are RPG II, Algol 60, ANS '74, Cobol, Fortran IV, PL/1, Basic, APL, Pascal, and SPL.

UDS Compact: UDS Compact is a compact version of the Siemens UDS database handler which is based on the proposals made by CODASYL (Conference on Data System Languages). UDS Compact enables users to initialize a database from a display terminal, retrieve data, and perform routine management tasks. UDS recognizes all records of a particular record type. Standard keys are defined and referenced by database statements. Compound search expressions allow the selection of records based on the contents of items within the record.

Clerical staff and occasional users of the database can access it through a nonprocedural Interactive Query Language (IQL). Users can formulate selections and output conditions based on relationships of items from different record types. IQL permits database modifications, deletions, and insertions.

Siemens 7.500 Series

▶ UDS has a fast restart facility in the case of system failure. Transaction-oriented backup and a number of facilities for restoring destroyed data provide a high level of database availability.

The major components of UDS Compact are comparable to the standard version and include: (1) a Data Definition Language (DDL) for defining the logical structure of data as seen by a user program and for defining the logical structure of the database as a whole, (2) a Data Base Handler (DBH), (3) a Data Manipulation Language (DML), (4) an Interactive Query Language (IQL), and (5) other service programs. For public sector use, a Compatible Data Base Interface (KDBS) has been developed.

UDS Compact runs under BS2000 Versions 5.1 and 6.0 and requires at least 500K bytes of main memory.

SESAM Compact: A linear database system, SESAM Compact provides interactive procedures for database initialization and maintenance; interactive database processing; a CALL interface that permits user programs to be written in RPG, Cobol, and other high-level languages; and password at the record field level. For public sector use, a compatible Data Base Interface (KLDS) has been developed.

GOLEM INFORMATION RETRIEVAL SYSTEM: This system provides access to the system from remote terminals. GOLEM uses a flexible, interactive, conversational language for data access that includes features for browsing, specification of descriptor ranges, etc. GOLEM also supports simultaneous terminal operations for multiple application programs, and can handle stored data in variable formats. Documents are logically divided into segments, and 5-level access codes are used to ensure data access security. Under BS2000, GOLEM is a pageable program.

UNIVERSAL TRANSACTION MONITOR: Part of the Transdata Data Communication Method (DCM), UTM controls, monitors, and protects the simultaneous interaction of multiple terminal users with the system. UTM performs such functions as program management, message communication, storage management, log file, transaction control, and integrated format control.

Model 7.521 uses UTM-B1 while all other models use UTM-B3. UTM is run under BS2000 from Release 5.1 and requires 50K bytes of main memory.

TRANSDATA COMMUNICATIONS SYSTEM: The Transdata network is a data communications application that can be tailored to a company's individual communications needs. The Transdata scheme is divided into five spheres of use. Each sphere is a subset of the next higher one. They include:

- Local Connections: Connections within the limits of the company's premises. An in-house network permits all forms of communications.

- Public Networks: The connections are made either by a rented tie-line or over the public telephone network, depending on the size of the scheme.

- Line Concentrator: Several terminals share a common line.

- Decentralized Data Processing: Transdata stations are connected to the central computer, but can also carry out data processing functions. They function to a large extent autonomously.

- Distributed Processing in Complex Networks: Several main computers are connected with communications processors to form a large network.

SOFTWARE TOOLS

BYBLOS is a documentation system that can be used throughout system development. BYBLOS is a text processing system, a database, and a data dictionary/directory. Its objective is to assist in the documentation of a project, its performance, system architecture, its data, and its program/module specifications. BYBLOS requires 850 pages and runs under BS2000 Version 5.1. It can be used interactively or in batch mode.

Colombus, a tool for structured programming, facilitates the conception and the development of programs. It provides automatic structural representation (structural lists and structograms). Colombus comes in three versions, Colombus-COB for Cobol, Colombus-FOR for Fortran, and Colombus-ASS for Assembler. All three can be run on the System 7.500. The Cobol Colombus requires 153 pages while the Assembler Colombus requires 132 pages; Colombus-FOR requires 117 pages.

Testmanager tests individual modules within programs. It simulates the interfaces between calling and called modules. Testmanager monitors tests, provides output logs, and offers a thorough set of test documentation. It requires 114 pages and can be used in both interactive and batch mode.

MMS (Module Measuring System) is used to optimize software by identifying inefficient modules. MMS needs 61 pages and can be run in both batch and interactive modes.

FMS (File Management System) economizes on disk storage allocations for small amounts of sequential and indexed sequential data. FMS requires 36 pages and can be run in both batch and interactive mode.

Cotune and Fortune are used for fine-tuning programs written in Cobol and Fortran, respectively. Fortune requires 48 pages while Cotune requires 135 pages.

GPSP (General Purpose String Processor), a macroprocessor, requires 116 pages of memory.

David, a data and archives management system, requires 555 or 462 pages of memory.

Formplag edits and controls input data from terminals. It requires 72 pages of memory.

Doculity, a format program for the preparation of text, facilitates the documenting of a project. It can be used in both batch and interactive modes and requires 40 pages.

APPLICATIONS SOFTWARE

Siemens provides a wide range of applications programs for commercial and technical use, some of which are detailed below.

DIFIB is an interactive accounting system.

Comet-PS supports planning and control functions. Given parameters and variables, it provides alternative solutions and is aimed at the construction industry. It requires 120 pages.

ISI comes in four versions: ISI-IDA, ISI-MV, ISI-GD, and ISI-TW. ISI-IDA is a system for order processing in industry and commerce. Its main functions are data capture, file updating, file retrieval using the matchcode system, and stock control. ISI-IDA uses 100 pages. It can be used in both batch and interactive modes.

ISI-MV is a stock control system. In batch mode, it needs 43 pages, and in interactive mode, 300 pages. It costs from ▶

Siemens 7.500 Series

► DM 30.537 to DM 32.297. ISO-GD is a data management system that maintains an element file (product definition or title, workplaces, time needed to produce) and a structural file (relationships between elements). It needs 38 pages in batch mode and 400 pages in interactive mode. ISI-TW optimizes resources and reduces machine idle time. It runs only in batch mode and requires 100 to 150 pages.

Trafic is an optimization program for organizations involved with vehicle scheduling. It needs 130 pages.

Sinet is an interactive system for network planning analysis. It needs 87 pages.

GPSS (General-Purpose Simulation System) is for operations research modeling. It needs 60 pages.

SICOS (Simulation of Continuous Systems) is another modeling system for scientific engineering and mathematical applications. It can be run in both batch and interactive mode. It needs 150 pages.

SERVICE/SUPPORT

DIAGNOSTICS: A teleservice terminal can be used with all models in the 7.500 Series. The terminal is added into the system remotely via a modem and provides remote diagnostics facilities. The user's machine is connected into the remote maintenance console in a Siemens service center where an engineer can use diagnostics programs to aid the user in identifying faults. The Teleservice terminal can also be used for the exchange of software programs. The maximum transmission rate is 300 bps.

MAINTENANCE: The basic maintenance contract covers support and services between 8:00 a.m. and 5:00 p.m. Monday to Friday excluding public holidays.

TRAINING: 7.500 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, The Netherlands, Spain, and Sweden. Training courses paid for separately by the user include service of the 7.500, BS2000 operating system installation and operation, and high-level languages. Courses vary in length from three days to two weeks.

DOCUMENTATION: General hardware and software documentation is provided free of charge with a 7.500 model. More detailed manuals can be purchased separately.

The 7.500 systems are available for purchase and on one-year and three-year rentals.

The following prices, in deutsch marks, have not been officially received or confirmed by Siemens. Prices will vary in different countries.

EQUIPMENT PRICES

	Purchase Price* (DM)
7.530 MODELS	
7.530-B with 2MB main memory	96.300
7.530-D with 4MB main memory	180.000
7.530-F with 4MB main memory	324.000
7.536-20 Compact Computer with 2MB main memory	159.000
7.550 MODELS	
7.550-B with 2MB main memory	330.000
7.550-D with 2MB main memory	420.400
7.550-N with 4MB main memory	800.000
7.570 MODELS	
7.570-B with 4MB main memory	990.000
7.570-C with 8MB main memory	1.292.000
7.570-G with 8MB main memory	1.822.700
7.570-P with 16MB main memory	3.645.400

Excluding maintenance.

PERIPHERALS

		Purchase Price (DM)
3027-1	Local workstation	8.640
3027-11	Local color workstation	12.760
3027-2	Remote workstation	10.900
3027-21	Remote color workstation	15.020
3337-51	DRU 600/64 printer	37.500
3337-52	DRU 600/64 printer for 7.530	32.000
3338-5	DRU 1500/48 printer for 7.500	75.000
3338-52	DRU 1200 printer for 7.530	73.500
3352-01	Laser-DRU 21000 ND 2 printer	404.410
3350-1	Laser-DRU 10500 ND 3 printer	269.290
2300	PCM Online Laser DRU 21000	486.100
2200	PCM Online Laser DRU 10500	315.970 ►

Siemens 7.500 Series

		Purchase Price (DM)
TAPE DRIVES		
3515	MBE 156/6250/9 (1LW + ST)	85.992
3515	MBE 312/6250/9 (1LW + ST)	95.262
3517-1	MBE 780/6250/9 (1LW + ST)	99.000
3518	MBE 625/6250/9 (1LW + ST)	79.000
3527-1	MBE 780/6250/9 (1LW)	53.000
3528	MBE 625/6250/9 (1LW)	39.600
35166-1	Two-channel switch for 3515, 3516	5.562
35156	Two-channel switch for 3517	5.562
3525	MBE 156/6250/9	39.642
3526	MBE 312/6250/9	48.912
3557	MBE-780/-6250/9 (1LW)	56.000
3559	MBE-1250/-6250/9 (1LW)	58.000
3513	ST max. 8 LW 3557, 3559	72.240
3521	MBE 40/1600/9	29.429
3523	MBE 80/1600/9	34.267
3511	ST max. 4 LW 3521, 3523	15.171
3535	MBE 156/6250/9 for 7.530	72.142
3536	MBE 312/6250/9 for 7.530	81.912
3537	MBE 780/6250/9 for 7.530-D and -F	89.000
DISKS		
3468	300MB	68.959
3470	420MB rigid disk	42.450
3431-2	63MB for 7.530	22.200
3432-2	126MB (F) for 7.530	20.000
3433-2	267MB (F) for 7.530	32.200
3475	756MB rigid disk	From 62.000
3418	ST for 3475	From 50.000
3480-1	Disk (F) 1.85GB	204.600
3418-22	ST for 3480	151.927
ADDITIONAL PERIPHERALS		
3257	Sorter 55000-130000 B/Std.	912.580
3171	Diskette drive 1.2MB, 2 LW	8.500 ∎