Nixdorf 8860 Information System

MANAGEMENT SUMMARY

UPDATE: *Since our last update, Nixdorf's 8860 Information Systems Series has experienced several important changes. The Model 30 has been withdrawn, and a new microcomputer, the Micro 3, has replaced it. 256KB memory chips now form the basis of the various systems' main memories, and memory capacities have increased on most models. The DAP 4BK workstation has been replaced by the DAP 4X, which offers 256KB of RAM. Nixdorf has modified its printer offerings extensively, withdrawing many models and introducing new ones. ICL emulations and support for Nixdorf's new Reflex DBMS round out the changes in the series.*

Nixdorf AG is one of Europe's largest independent suppliers of computer systems. The company has over 24,000 employees throughout the world and in 1985 had total revenues of DM 3.93 billion, a 20 percent increase over 1984 figures. Midyear 1986 returns showed revenue growth of 10 percent over the midyear 1985 returns. Of the total revenue, over 50 percent was generated from sales of computer systems, while over 40 percent came from services, including consulting, system and user software, field maintenance, training, and rentals. The company has extensive expansion plans, and, fueled by capital spending (30 percent greater in 1986 than in 1985) and building programs in Berlin, Ireland, and Singapore, it may achieve its goal of doubling revenues in the next four to five years.

Nixdorf workstations have made a particularly deep penetration into the banking industry. The company is also proud of its commitment to communications and networking and claims to make that capability the cornerstone of its systems line.

The Nixdorf 8860 can be configured as a standalone workstation or as a cluster controller capable of supporting up to 32 workstations. The series consists of five models: the ▷

The Nixdorf 8860 Information System provides distributed processing in a Cobol-oriented environment. It also offers extensive communications and emulation facilities.

The Nixdorf 8860 Information System can function in either a standalone or distributed processing mode to provide a full range of Cobol-oriented functionality. The proprietary operating system is fully consistent throughout the series, and numerous links are available to mainframe machines manufactured by IBM and others.

MODELS: Micro 1, Micro 2, Micro 3, Model 4, and Model 50.
MAIN MEMORY: 1MB to 4MB.
DISK CAPACITY: 780KB and 1MB diskettes; 20MB to 1056MB fixed disk drives.
WORKSTATIONS: Up to 32.

CHARACTERISTICS

MANUFACTURER: Nixdorf Computer AG, Fürstenalle 7, 4790, Paderborn, West Germany. Telephone (05251) 150.

COMPANY LOCATIONS: *Australia:* Nixdorf Computer Pty. Ltd., 655 Pacific Highway, P.O. Box 235, St. Leonards N.S.W. 2065. Telephone (02) 439 5477; *Austria:* Nixdorf Computer GmbH, Untere Donaustr. 11, 1020 Vienna. Telephone (0222) 266767; *Belgium:* Nixdorf Computer SA, Rue Colonel Bourg 105, 1040 Brussels. Telephone (02) 735 8050; *Brazil:* Nixdorf Computer Equipamentos Electrônicos Ltda., Rua Haddock Lobo Nr. 1327-4 andar, 01414 São Paulo. Telephone (011) 853 7847; *Canada:* Nixdorf Computer Canada Ltd., 505 Consumers Road, Suite 102, Willowdale, Ontario M2J 4V8. Telephone (416) 498 7200; *Denmark:* Nixdorf Computer A/S, Hoerkaer 20, 2730 Herlev. Telephone (02) 913100; *Eire:* Nixdorf Computer Ltd., Fitzwilliam Court, Leeson Close, Dublin 2. Telephone (01) 767551; *Finland:* OY Nixdorf Computer AB, Louhelantie 10, 01600 Vantaa 60. Telephone (080) 53061; *France:* Nixdorf Computer SA, 7-13 Bd. de Courbevoie, 92200 Neuilly-sur-Seine. Telephone (01) 747 1270; *Greece:* Nixdorf Computer AE, Sygrou + Skra 1, Athen-Kallithea. Telephone (01) 959 5190; *Hong Kong:* Nixdorf Computer Ltd., Unit A, 9th Floor United Centre, 95 Queensway, Central Hong Kong. Telephone (025) 202222; *Italy:* Nixdorf Computer S.p.A., Via Piranesi 46, 20137 Milan. Telephone (02) 73961; *Japan:* Nixdorf Computer Japan K.K., Dai-2 Yamazaki Bldg., 5-22-38 Higashi-Gotanda, Shinagawa-ku, Tokyo 141. Telephone (03) 440 0351; *Luxembourg:* Nixdorf Computer SA, 107-111 route d'Arlon, 8009 Strassen. Telephone 312828; *Morocco:* Nixdorf Computer SA, 23 Bd Girardot, Casablanca. Telephone 307639; *Netherlands:* Nixdorf Computer b.v, Postbus 29, Mijlweg 7-9 4130 AE Vianen. Telephone (0347) 372904; *New Zealand:* Nixdorf Computer Ltd., Wellesley St., P.O. Box 6173, Auckland 1. Telephone (09) 399866; *Norway:* Nixdorf Computer A/S, Lilleakerveien 25, Oslo 2. Telephone (02) 122650; *Singapore:* Nixdorf Computer Pte. Ltd., 20-00 NOL Bldg., 456 Alexandra Road, Singapore 0511. Telephone 274 1100; *South Africa:* Nixdorf Computer Pty. Ltd., Triomf House, Stanley Avenue, Milpark, P.O. Box 7911, Johannesburg 2000. Telephone (011) 726 3300; *Spain:* Nixdorf Computer SA, Capitán Haya 38, Madrid 20. Telephone (01) 279 7806; *Sweden:* Nixdorf Computer AB, Dalvägen 22, 17136 Solna. Telephone (08) 730 0600; *Switzerland:* Nixdorf Computer AG, Obstgartenstr. 25, 8302 Kloten. Telephone (01) ▶

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▷ Micro 1, Micro 2, Micro 3, Model 4, and Model 50. An ancillary offering is the 8860/33 terminal system, consisting of 5 models that carry the same names as the equivalent 8860 models. Nixdorf also markets the 8860 as the 8862 Retail System and the 8864 Banking System. The latter two versions are based on identical central hardware, but include, respectively, POS terminals and banking terminals in their configurations.

Nixdorf has its own NCN network architecture, upon which it relies for 8860-to-8860 communications, although the company is also committed to the Ethernet specifications. All data communications within the Nixdorf 8860 Series are managed by Nixdorf's proprietary telecommunications operating system (TECOS), which allows simultaneous communication using a wide variety of procedures and protocols. The series is compatible with the SNA environment and allows access to packet-switching services.

In an SNA network, the System 8860 serves as a cluster controller node. Support is given both to several physical units in a CPU and to several logical units within a physical unit. Nixdorf provides full emulation tools to allow 8860 systems to transparently communicate with IBM, Siemens, Unisys, Bull, ICL, and other mainframes.

The Nixdorf 8860 is centered around a full Cobol (ANSI 74) compiler that fully supports batch and dialog processing, coupled with an extensive range of utilities and development tools. All system and applications software can be downloaded to remote sites using software provided on the central 8860 system, and this same central system can be used for remote support of users through a system-to-system or workstation-to-system connection.

The 8860 operating system is largely menu driven and has a HELP facility available to all users. A full job control language is onboard, and programmers have access to an ▷

▶ 814 3434; *Turkey:* Nixdorf Computer Ticaret A/S, Atlantik Han, Findikli, Istanbul. Telephone (01) 143 2593; *United Kingdom:* Nixdorf Computer Ltd., 125-135 Staines Rd., Hounslow, Middlesex TW3 3JB. Telephone (01) 570 1888; *USA:* Nixdorf Computer Corporation, 300 Third Avenue, Waltham, MA 02154. Telephone (617) 890 3600.

DISTRIBUTORS: Nixdorf is represented by agencies in the following countries: Argentina, Chile, Egypt, Indonesia, Israel, Korea, Malaysia, Peru, Portugal, Sri Lanka, Thailand, Venezuela, Yugoslavia, and Zimbabwe.

DATE ANNOUNCED: August 1976.

DATE OF FIRST DELIVERY: August 1976.

DATA FORMATS

BASIC UNIT: 8-bit byte, 16-bit word with 20-bit addressing (NR 20 processor) or 22-bit addressing (NR 22 processor). Each byte can represent one alphanumeric character, two digits per byte.

FIXED-POINT OPERANDS: Operand access can be direct indexed, and indirect indexed.

INSTRUCTIONS: 111 basic instructions. Memory-to-memory instructions are executed directly by the resident microprogram.

INTERNAL CODE: EBCDIC.

MAIN STORAGE

TYPE: MOS memory chips with 256KB capacity form the main memory. Power fail backup secures the system for 30 minutes following power loss.

CYCLE TIME: 370 ns for two bytes on the Model 50.

CAPACITY: Micro 1—1MB; Micro 2 and Micro 3—1MB to 2MB; Model 4 and Model 50—1MB to 4MB.

CHECKING: Semiconductor memory with error detection error correction (EDEC) logic that corrects one-bit errors and detects two-bit errors. ▶
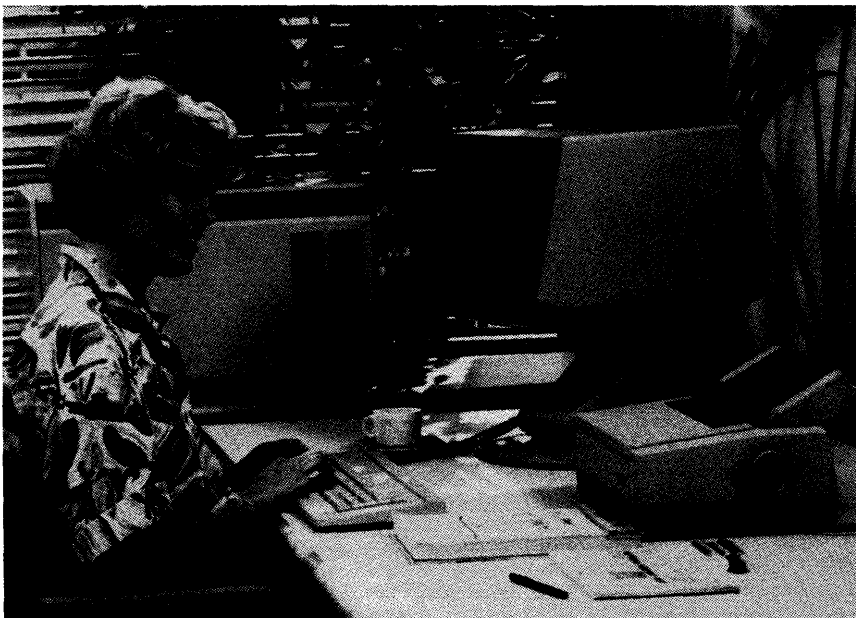
The 8860/33 Terminal System complements the 8860 Information System and can be upgraded to full 8860 capability.

Nixdorf 8860 Information System

NIXDORF 8860 CHARACTERISTICS

	Micro 1	Micro 2	Micro 3	Model 4	Model 50
Main Memory					
Minimum	1MB	1MB	1MB	1MB	1MB
Maximum	1MB	2MB	2MB	4MB	4MB
Processor	NR 20	NR 22	NR 22	NR 22	NR 22
Diskette Storage					
5¼", 780KB	1	1	1	0	0
8", 1MB	0	0-1	0	0-1	0-1
Disk Storage					
5¼", 10MB	0-1	0-1	0	0	0
5¼", 20MB	0-1	0-1	0	0	0
5¼", 33MB	0	0-1	0-2	0-2	0
5¼", 66MB	0	0-1	0-2	0-2	0
8", 66MB	0	0	0	0-2	0-4
8", 132MB	0	0	0	0-2	0-4
14", 264MB	0	0	0	0	0-4
Max. Disk Storage	20MB	66MB	132MB	264MB	1056MB
Streaming Tape Cassette	0-1	0-1	0-1	0-1	0-1
Streaming Mode Tape	0	0	0	0	0-2
Workstations	1-2	1-6	1-8	1-12	1-32

▶ interactive editor especially designed to streamline Cobol coding, compiling, and debugging. The job control language has been modeled after Pascal and has a full complement of branching statements.

The operating system uses a supervisor function to make time-sharing transparent to users and to eliminate the need for software adjustments by programmers. Similarly, with code sharing, one program can be simultaneously utilized by several workstations on a network.

Of special interest is the DIALIS program and report generation system. Using this system, an analyst, programmer, or end user can prototype and generate code for simple data input and processing applications in an interactive screen session. The generated code is accessible for optimization and refinement.

All Nixdorf 8860 systems except the Micro 1 are based on the NR 22 processor. The Micro 1 uses the Very Large Scale Integration NR 20. The Micro 1 has main memory of 1MB, one 5¼-inch fixed disk, and one 5¼-inch diskette or streaming tape cassette. It can support two workstations and associated printers. Two, three, or four communications channels are provided.

The Micro 2 is similar to the Micro 1. Alterations include a different microprocessor, a main memory of 1MB or 2MB, the addition of an 8-inch diskette, support for four workstations and printers, and connection for one system printer. In addition, the Micro 2 supports a maximum of six communications channels.

The Micro 3, the newest member of the series, supports up to eight workstations, has a main memory of 1MB or 2MB, and offers a maximum of 132MB of mass storage. ▷

STORAGE PROTECTION: Two boundary registers are used to provide write protection. Systems programs are assigned a privilege level; user programs are nonprivileged. Only the current data area referenced by the active program partition can be written to, thus protecting the remainder of main memory from corruption. Software address supervising is superfluous. On the privileged level, write protection is removed, base registers can be modified, and I/O addresses referenced.

CENTRAL PROCESSORS: All CPUs have the same standard system architecture and can interface identical peripheral devices. Also, different 8860 CPUs can be transparently connected in a network system.

The Micro 1 uses the proprietary NR 20 processor, while the Micro 2, Micro 3, Model 4, and Model 50 use the NR 22 processor.

Intelligent front-end processors control data transmission with a maximum speed of 9600 bps under the software control of TECOS. Different contending procedures can run on the two line outputs of the front-end processor.

REGISTERS: Registers are 16 bits wide and include:

—six general registers

—one data base register (interrupt stack pointer)

—one instruction count register

—one program status register

—one subroutine stack pointer

—four registers for addressing the total area of 1MB

ADDRESSING: The 16-bit processors employed in the 8860 Series have been extended with a 22-bit addressing logic that enables them to address a real memory of 4096KB via base registers. Byte or half-word access is supported to byte addresses. Address areas of 64KB can be directly addressed. ▶

▶ Main memory on the Model 4 extends from 1MB to 4MB. Disk storage includes two 8-inch drives, maximum of 132MB on each drive, one 8-inch diskette, and a streaming tape cassette. Between two and 10 communications channels are provided for eight workstations and one system printer.

The Model 50 provides main memory capacity of from 1MB up to 4MB. Both 14-inch and 8-inch disk drives are offered, yielding a total of 1056MB of mass storage. It also supports an 8-inch diskette, a streaming tape cassette, and two streaming mode tapes. The Model 50 can support up to 32 workstations and two system printers on 24 communications channels.

Workstations can be connected to the 8860 systems through normal in-house or telephone lines. Nixdorf provides a variety of workstation models, including monochrome amber-on-brown or black-on-white as well as color units. Also available is the Professional Workstation (PWS), a multifunction workstation that also provides personal computing facilities via the industry-standard MS-DOS operating system. Nixdorf offers the PWS for most of its systems, including the 8870 minicomputer.

The Nixdorf 8860/33 is a terminal system compatible with the 8860 Series. Emulation packages are available to provide for the use of the 8860/33 in place of remote workstations from other manufacturers. The 8860/33 is available in 5 models: Micro 1, Micro 2, Micro 3, Model 4, and Model 50. Added components can upgrade these 8860/33 systems to full 8860 models.

COMPETITIVE POSITION

By keeping its corporate resources focused on a particular set of market niches, Nixdorf has been able to gain a reputation for dependable and cost/effective systems for banking, retail, and office processing. About half of Nixdorf's total revenues come from the German market, and, in total, 90 percent of the company's revenues come from Europe. This leaves a small share of overseas sales. Over the past year, Nixdorf has shown particular interest in the North American market, winning a significant contract in July 1986 from the Montgomery Ward retail chain, for example.

Within Nixdorf's mix of product offerings, the 8860 Series complements the 8850 Series, differing from that series both in the software it offers and in its higher memory capacities.

The Nixdorf 8860 Series competes with the IBM 8100 system and other small-business minicomputers that offer distributed processing. Such systems as Texas Instruments' Business Systems 200 and 300, ICL's DRS 20 Series, Prime's Information Series, NCR's I-9000 Series, Data General's CS Series, and Burroughs's B 90 and B 900 are among these competitors.

▶ INTERRUPTS: Two interrupt levels are used for internal errors, power failure, parity, timing errors, clock, and I/O interrupt. Hardware-control stack management is used to branch into the interrupt routine.

INPUT/OUTPUT CONTROL: 2KB I/O addresses are integral. The peripheral processors are accessed via these addresses.

CONFIGURATION RULES: In its basic configuration, each model contains main memory, communications channels, and mass storage units which can be diskette drives or fixed disk drives. Streaming tape units are available for backup storage. Workstation peripherals are supported by all models, but are not available as part of the basic configuration.

Depending upon the CPU type, communications channels can be supported for local or remote workstations in multipoint or point-to-point mode, connection to host systems (IBM, ICL, Siemens, Unisys, Bull) employing either bit- or character-oriented procedures, or connection to a network with other Nixdorf systems.

Micro 1: The Micro 1 has a main memory capacity of 1MB. It is equipped with either a 10MB or a 20MB fixed disk drive and either a 720KB diskette or a 40MB streaming tape unit. The basic Micro 1 has two communications channels, expandable to four. Two display units and two workstation printers can be supported by the system.

Micro 2: Main memory is 1MB or 2MB, and mass storage consists of one 10MB or one 20MB fixed disk drive, and a 780KB diskette unit, a 1MB diskette unit, or a 40MB streaming tape unit. The Micro 2 includes from two to six communications lines and can support four display units, four workstation printers, and one system printer.

Micro 3: Main memory is 1MB or 2MB, and mass storage consists of one or two 33MB fixed disk drives, 66MB disk drives, or 780KB diskette units, to a maximum of 132MB. The system also supports one 40MB streaming tape unit. It supports up to eight workstations.

Model 4: Main memory on the Model 4 extends from 1MB to 4MB. The basic system contains one 16MB fixed disk. The unit can hold two disk drives with capacities of 16MB, 32MB, 66MB, or 132MB, up to a total of 264MB. One 45MB streaming tape unit is standard. One 1MB diskette is optional. The Model 4 includes from two to 10 communications lines and can support eight display units, eight workstation printers, and one system printer.

Model 50: The Model 50 has 1MB of main memory in its basic configuration, expandable to 4MB. Mass storage capacity comprises a maximum of four 14-inch or 8-inch disk drives, and up to two 1MB diskette units. Total storage capacity is 1056MB. The standard configuration includes one 66MB streaming tape unit, and a second can optionally be added to the system. From two to 24 communications lines are available, and the Model 50 supports up to 32 display units and workstation printers, and two system printers.

The Nixdorf 8860/33 terminal system is available in 5 models: Micro 1, Micro 2, Micro 3, Model 4, and Model 50. Processor, main memory, and communications channel details are as for the relevant 8860 model. The number of workstations supported by each model is higher than for the associated 8860 model, but decreases as the 8860/33 is upgraded to a full 8860. The number of workstations supported by the 8860/33 systems is as follows: Micro 1—4; Micro 2—12; Micro 3—16; Model 4—24; Model 50—32. Each of the 8860/33 models contains a 1MB 8-inch diskette for transporting data.

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▷ ADVANTAGES AND RESTRICTIONS

The strongest advantage of this series is the consistent hardware and software architecture implemented in all of the different models. These features are further augmented by a Cobol applications environment with an emphasis on end-user interaction using program and report generation tools. In this same vein, Nixdorf has designed the operating system to reduce the need for software control of file access and software housekeeping and maintenance. Nixdorf has also made field upgrades possible and minimized the need for service people to come on-site. Improved terminal availability is promised by means of shared code segments and the management of partitions in the operating software. Overlapped processing within the central unit increases the throughput and the overall productivity of the system.

Nixdorf has also made the 8860 Series more flexible by introducing the new 8860/33 terminal system. This multi-terminal system offers a variety of emulation packages including IBM 3270/3770, Siemens 8160/9750, Unisys UTS, and the Bull Questar, and can be used as an RJE station, or as a remote workstation system. By integrating additional components the 8860 can be upgraded as needed to a full distributed data processing system supporting as many as 32 display workstations. It can also be upgraded to a full 8860 distributed data processing system. □

▶ Emulation protocols provided for on the 8860/33 terminal system are as follows: IBM 3270, IBM SNA/RJE 3770, Siemens 8160/9750, Unisys UTS/U100, and Bull.

WORKSTATIONS: Nixdorf provides a number of display unit models for use with the 8860 system. Freestanding, nonglare displays are standard, and brightness and contrast are continuously adjustable. The keyboard with all models is separate with a standard typewriter layout. A height-adjustable desk can be purchased with adjustable positioning for keyboard and display.

All workstation components (display, keyboard, printer, etc.) have their own onboard processors and control their own connections to the main system unit via a standard interface, thus reducing central system load and distributing load during peak periods. Display units have their own power pack. All workstations can communicate with the 8860 system over the Nixdorf NBN local area network. Almost any device that has a V.24 interface can use the broadband network to exchange information with the desired communication partner.

DAP 4: This workstation displays 2,000 amber characters on a dark background as 25 lines by 80 columns. The unit has 32KB of display memory.

DAP 4X: This display unit is specifically designed for EDP applications, Teletex, and Videotex. The 12-inch screen offers a 25-by-80, 27-by-132, or 32-by-80 character display. The unit contains 256KB RAM. There are 256 different characters, and character attributes include normal intensity, underscoring, separation, invert flashing, cursor, double width, double height, and super- and subscripting. The DAP 4BK measures 305 by 315 by 450 mm and weighs 13 kg.

DAP 9X: This unit is a version of the DAP 4X designed for front-office applications. It is equipped with a 9-inch screen instead of the 12-inch screen provided with the DAP 4X. It measures 137 by 248 by 257 mm.

DAP 6: This color display unit is intended for EDP applications and Videotex. The 14-inch screen displays up to 2,560 characters as 32 lines by 80 columns. Thirty-two foreground and thirty two background colors are available. Graphics characters can be obtained through the addition of a controller. The unit contains 256KB of display memory. The DAP 6 can emulate the IBM 3179 data display terminal.

PWS (Professional Workstation): The PWS is a multifunction workstation intended mainly for clerical jobs. It can, however, be used as a personal computer when the MS-DOS operating system is employed. The PWS is based on the 16-bit Intel iAPX 186 microprocessor with 1MB of RAM; the 8087 processor is optionally available to speed up graphics operations. Two 0.7MB diskette drives can be included within the central unit. The 15-inch screen can be divided into a maximum of eight windows. The screen can be formatted in a number of ways: 25 lines by 80 columns; 33 by 116; 27 by 132; or 25 by 40. The black characters are displayed on a white background. Character attributes include bold print, flashing, underscoring, inversion, double height, double width, and invisible.

PRINTERS: The following printers are available for the 8860.

MD 06 Mini Ink Jet Printer: Print speed of 150 cps; character set of 113; maximum of 137 characters per line at 17 characters per inch.

ND 11 Heavy Duty Compact Printer: Print speed of 210 cps; elongated or bar code type fonts with various character sizes; maximum of 158 characters per line at 12 characters per inch; single-sheet feeder.

ND 20 Form/Document Printer: Print speed of 150 cps; elongated and OCR A type fonts; maximum of 197 characters per line at 15 characters per inch; single-sheet feeder.

ND 22 Heavy Duty Compact Printer: Same characteristics as the ND 11, except for a dual form feeder and a maximum of 229 characters per line at 12 characters per inch.

ND 24 Multifunctional Printer: Print speed of 140 cps; proportional spacing, bold and elongated print, near letter quality print; bar code reader; OCR A/B; maximum of 132 characters per line at 16.6 characters per inch; single- and dual-sheet feeder.

ND 25 Multifunctional Printer: Similar to the ND 24, but with a maximum of 198 characters per line at 15 characters per inch.

ND 26 Mini Needle Printer: Print speed of 100 cps; elongated type font; maximum of 137 characters at 17.5 characters per inch.

TD 06 Daisywheel Printer: Print speed 35 cps; 100 characters per daisywheel; various daisywheel fonts available; maximum of 225 characters per line at 15 characters per inch; dual-sheet feeder.

TD 08 Letter Quality Typewriter: Print speed 20 cps; typewriter/printer version of the TD 06.

ZD 09 Workstation Line Printer: Print speed 300 lpm; elongated; OCR A/B; bold; bar code reader; near letter quality; maximum of 198 characters per line at 15 characters per inch. ▶

▶ **ND 27 Multifunctional Heavy Duty Printer:** Print speed 400 cps; elongated; OCR A/B; bold; near letter quality; bar code; line spacing from 3 to 60 lines per inch; maximum of 225 characters per line at 16.6 characters per inch.

MD 07 Xerographic Page Printer: Print speed of eight A4 pages per minute; various exchangeable type font cassettes; graphics page memory with graphics processor (1.3MB).

OTHER PERIPHERALS: An ID card unit is optionally provided for attachment to the display terminal. Suitable cards are identical in size to Eurocheque cards with the same format and meet ISO requirements for credit cards. Data is stored on a magnetic strip on the reverse of the card in a serial bit and character format. A SWIPE card reader unit is also optionally available, but can be used only to read already encoded ID cards.

MASS STORAGE

DISKETTE UNITS: 780KB 5¼-inch drives and 1MB 8-inch drives are available with the 8860 Series. One 780KB unit is standard on the Micro 1 and Micro 2. The 1MB drive is optional on the Micro 2, Model 4, Model 30, and Model 50. With the exception of the Model 50, which supports two drives, all systems support one unit.

FIXED DISK DRIVES: These are available in different physical sizes and with varying capacities for the different 8860 systems.

5¼-INCH FIXED DRIVES: One or two 10MB and 20MB units are available on the Micro 1, Micro 2, and Micro 3.

8-INCH FIXED DRIVES: 8-inch fixed disk units are supported on Model 4 and Model 50. The drives are available in four capacities: 16MB, 32MB, 66MB, and 132MB capacities.

14-INCH FIXED DRIVES: The Model 50 employs 14-inch fixed disk units. Drives can have the following capacities: 132MB or 264MB. Each model can support up to four 132MB or 264MB drives.

COMMUNICATIONS CONTROL

All available communications modes are implemented with intelligent front-end processors that come with their own memory, microprocessor, and highly integrated line interface.

The front-end processors that control data transmission support the following interfaces:

—**V.24 interface** for leased lines and dial-up lines in the analog network.

—**X.21 interface** for digital networks, either in the circuit-switching network or packet-switching network.

—**V.25 interface** for automatic dialing in the analog and digital networks.

—**IHSS interface** (Nixdorf Inhouse Interface) for connecting workstations with unshielded two- or four-wire lines without modems up to a distance of 2,000 meters.

Both character- and bit-oriented communications procedures are fully supported, as described below.

CHARACTER-ORIENTED PROCEDURES: Basic Mode Control Procedures for Data Communication Systems (BDC) are used to manage both interactive and batch operations. In polling mode, the master (active) station issues requests while tributary (passive) stations react; in conten-

tion mode, both data terminals can independently establish the requisite data link. A transparent, code-independent mode is supported that transmits all characters (including control and packed binary) as data characters; standard, code-oriented transmission separates data and control characters. ISO 7-bit or internal EBCDIC codes may be selected. The following control procedures are also supported:

- DIN 66019 (excluding interactive mode)

- Siemens MSV1, MSV2, LSV1, and LSV2

- IBM 2770, 2780, 3270 (tributary station), 3740, and 3780

- Unisys U100

- Honeywell VIP 7700

- Teletype TTY

- ICL 7501/7502, 7181, and DRS20

BIT-ORIENTED PROCEDURES: Bit-oriented procedures allow synchronous communications between data terminals regardless of the bit sequence. Any bit combination can be sent with control data being defined by the position within the transmission block; each transmission block is secured against corruption. The following bit-oriented procedures are available for 8860 units:

HDLC Primary: The HDLC Primary acts as a master to one or more secondaries, transferring data in half-duplex bidirectional and alternate modes. It can be employed in point-to-point, multipoint, leased line, dial-up line, and full- or half-duplex line configurations at transmission speeds up to 9600 bps.

HDLC Secondary: The secondary has similar technical specifications to the HDLC Primary but acts as the primary's slave, receiving commands from and sending responses back to the primary.

LAPB: LAPB (Link Access Procedure Balanced) allows each terminal to serve as both a primary and secondary link. Either can initiate data transfer, thus optimizing line usage. Point-to-point, leased line, dial-up line, and full-duplex configurations are possible with transmission speeds of up to 9600 bps.

SDLC: This IBM-supported standard procedure has the same requirements as the standardized HDLC described above and is fully available for the 8860.

Up to four local workstations can be connected to a given communications channel for transmission at speeds up to 19,200 bps with connections made using unshielded two- or four-wire telephone lines of up to 2,000 meters. The IHSS makes modems unnecessary for local workstation connection.

Remote workstations can be connected in multipoint or point-to-point mode. In point-to-point mode, only one workstation per line can be connected via V.24 or X.21 interfaces, and appropriate modems must be installed. In multipoint mode, four remote workstations can be connected using V.24 interfaces and appropriate modems. Only leased lines can be used for transmission, and a multipoint unit must be used to convert the V.24 interface of the modem to the IHSS.

All 8860 models can be connected to mainframe units manufactured by IBM, Siemens, ICL, Unisys, and Bull. Communications with several hosts of the same or different equipment using the same or different transmission procedures is possible simultaneously, limited only by the particular system configuration and the application profile. Capability is as below: ▶

► IBM: To the 370, 303X, 43XX using communications controller 270X, 370X, and ICA.

Siemens: To the 7000 and 4004 using 3630 and 968X.

Unisys: To the 9000, 400 and 1100.

SOFTWARE

OPERATING SYSTEMS: Nixdorf supplies a proprietary operating system for the 8860 Series that can simultaneously handle dialog processing in an interactive mode, communications, and batch processing. The system covers the following areas: supervisor, Input Output Control System (IOCS), job control system, telecommunications operating system, interactive editor, interactive test system, and various other utilities.

Supervisor: This function employs interrupt-driven hardware to monitor physical system performance and to provide transparency to users working in a time-sharing environment. Processor time and main memory are allocated among discrete user partitions with partitions active sequentially under supervisor control. Partitions can be assigned one of four priority levels to further control access and processor time. Up to 32 dialogue and 8 batch partitions can operate simultaneously. Each partition can be 64KB in size. Code segments can be held in a common system area, known as a Segment Storage Pool (SSP), in which case the partition is used for local data storage only. Additionally, several workstations can share the same code segment in order to efficiently utilize machine resources. An overlay controller manages the loading of program segments at runtime from a system resident library of available segments with overlays permitted to any depth. Data can be exchanged between discrete partitions. Parallel processing is supported, allowing user partition and its own I/O operations to be executed at the same time.

IOCS: IOCS (Input Output Control System) supports logical access management to files and devices, thus relieving applications programmers from this task. This system supports direct, sequential, and indexed-sequential access to random-access files and sequential access to magnetic tape files. It supports transaction-oriented peripheral devices such as card readers and printers and manages multiuser file sharing and record lock/unlock. A HELP function can be triggered to explain job control tools to users. System, program, and error messages are displayed in the status line of a specific workstation by means of the user communication feature folded into the job control system.

Of special note is the support of SKAM (sequential keyed access method) which increases efficiency through the logical addressing of data records within files according to identifying keys. The number of index files is limited only by random-access memory capacity. Each file can be handled by several terminals defining up to 14 alternate keys and permitting multivalue alternate keys. The data records are accessed using dynamically managed index trees to reference the appropriate data block. Support of alternate keys makes it possible to define several access paths for one data file.

Job Control: This system manages the batch and dialog controls for all user programs, defines user profiles, and monitors access credentials. It also performs logging, spooling, and backup runs. Three-level user menus eliminate much of the need to master a special job control language (JCL). A job manager interactively handles daily routine operations. The job processor manages foreground and background routines.

Depending upon the password level of the user, the job manager supplies the following functions: start-of-day routine for configuring job/spool systems, end-of-day routine for clearing all queues and dynamic areas, job control editor for creating and amending job control programs, system status tests for all generated jobs, selector management for manipulating workstation selector menus that place program subsets at user disposal, examination of log file, and file save operations. A full accounting procedure handles the accounts for all jobs executed by the owner of a password.

The job processor loads the start-of-day routine into each background partition, where a terminal is allocated for error and status displays. It is not necessary to dedicate a terminal to background processing, since communication between the user and the background partition is intermittent. Background operation can be interrupted by the user through the job manager facility.

The JCL is based on Pascal and includes structures for logical control of JCL programs (IF/ELSE) and conditional creation of loops (WHILE). JCL employs Boolean variables and outputs messages to users. Statements can be entered either interactively or through sequential job control.

Telecommunication Operating System: TECOS centrally controls and manages all data communications activities using a level design schema in which alterations to one level are locked out from other nonparticipating levels. Files control the interface between TECOS and application programs, and user partition file assignment is handled at system generation. Individual levels handle different tasks:

• IOCS jobs are received and forwarded at the highest level, and job completion is reported.

• The logical/physical unit (LU/PU) functions at the emulation level with SNA connections. Emphasis is on data compression/decompression.

• At the link control level, line-specific read/write jobs are generated and entered in corresponding front-end processor queues.

• Front-end processors are initialized and loaded with appropriate procedure packages at the lowest TECOS level.

The operating systems provide ample programming support directly by allowing program input in dialog mode with the full-screen editor, program compilation at the workstation, compilation printout on the terminal or line printer, immediate correction of syntax errors at the workstation, and error detection tests in the object program using the interactive Cobol test system. Using the batch mode, several Cobol compilings can be run simultaneously. Punched card source program input can be accepted by the system. Operating facilities include:

Interactive Editor: Full-screen support is provided for insertion, deletion, replacement, and copying of source code segments; source libraries can be easily established. Segments can be listed, updated, and inserted via punched card media. All facilities of the editor are freely accessible at all times on any connected terminal.

Interactive Cobol test system: This system generates testing data and file output, including testing data controlled by DEBUG sections. Stop addresses can be set, the contents of data areas can be displayed on-line, and program abort can trigger an optional dump for efficient error specification.

Utility Programs: Utilities can be called at any time from the system library and include:

• INIT: initialization of data carriers and check of random-access read/write ability. ►

- **ALLOCATE:** Area allocation or clearance of files on random-access memories.

- **DUMP:** Output of labels and volume or file contents to the screen or printer in either hexadecimal or character representation.

- **REORG:** Redistribution of unused file areas to optimize disk capacity when entering new records. Also, damaged chaining links within the file can be detected and repaired.

- **COPY:** Data backup and off-line data exchange supported, including copy of complete data carriers.

- **COMPARE:** Automatic comparison of two files with differences output to the printer.

- **DATA BACKUP:** Entire contents of magnetic disk can be output to tape or reloaded from tape.

- **LIBRARY ADMINISTRATOR:** Management of all object programs and resident system libraries.

DATABASE MANAGEMENT: All 8860 systems support Nixdorf's Reflex database management system. Reflex is a relational database management system currently available on Nixdorf's 8860, 8890, and Targon systems, capable of distributed database applications across systems. Versions for MVS and VMS are under development.

COBOL COMPILER: All 8860 systems use ANSI-Cobol 74 with all Level 1 and most Level 2 requirements fully met. As well as the nucleus, full support is provided for the following processing modules: Table Handling, Sequential I/O, Relative I/O, Indexed I/O, Library, Copy, Debug, and Interprogram Communication. All code is reentrant, thus permitting simultaneous use across several workstations. Bridgeware programs are included to facilitate conversion from Cobol 1968 to Cobol 1974. Compiler size is approximately 200KB, and minimum partition sizes of 38KB are required for programming.

The DIALIS dialog and report program generator allow end users to develop simple applications in an interactive mode. Programmers can employ DIALIS to create a program skeleton that can be further refined with Cobol code. DIALIS requires installation of the DIPOS operating system. The procedure is as follows:

- Screen and listing formats are created at the workstation.

- The generator presents a screen format into which field type, verifications, calculation procedures, and other parameters can be entered. Standard values are automatically applied for parameters not entered.

- After checking, the field description table is stored in the relevant library. At this point, the program can be generated, compiled, and executed.

The generated program covers all major data entry, verification, and test requirements. The following program functions can be menu-selected: enter new records, display and edit existing records, delete obsolete records, and search for and display records within the data file.

REPORT PROGRAM GENERATOR: This program creates operable Cobol programs using interactively created record layout descriptions, file and field descriptions, input description, and report element description. A sequential input file can be processed and up to 15 files can be referenced at one time. Reports provide title pages, page headers, group header and footer of hierarchy level n, and end pages. Up to six hierarchy levels can be defined.

ASSEMBLER LANGUAGE: Using mnemonics, programmers can approach machine level with a 1:1 relation between symbolic and machine instructions. Macroinstructions are fully supported and macroroutines are merged at runtime from the macrolibrary. Character strings, half words, and decimal fields can be symbolically addressed. The smallest addressable unit is one byte. General and special registers can be accessed to lock out alteration of special registers by a user program. The assembler requires the DIPOS operating system.

The following basic instruction types are implemented: Compare, Subtract, Add, Branch, Exclusive OR, Logical OR, Logical AND, Load, Memory Shift, Register Multiplication, and IOCS calls for all devices. Multiple-address instructions can be used to process character strings, decimal fields, and format modifications. These include compare instructions for character strings, transport instructions, instructions for decimal fields, instructions for modifying the data format, shift instructions for decimal fields, and print editing.

Supervisor calls communicate with the operating system and provide the following levels of functionality at the assembler level: program change, check for system shutdown obstructions, termination of program in partition n, release volume for exchange, set time-slice for partition n, set date and time for the system, system shutdown, test if warning exists, issue diagnostic message, interpartition move, and issue release level.

EMULATION OF IBM 3270: This license program allows an 8860 user to communicate with Models 370, 303X, or 43XX, with part of the system acting as a 3274 or 3276 controller and other parts assuming necessary processing tasks. This program can be called up at any time from user dialog or an application program and runs under the control of the 8860 operating system. The IBM mainframe sees the 8860 system under the control of the emulator as a 3274 or 3276 controller. Central application programs, TP monitors, and access methods can remain unchanged. Both leased and dial-up lines can be used for connection to the host system at transmission rates up to 9600 bps. The emulator supports the functions of the 3270 typewriter keyboard. The 3270 emulator can be installed on all 8860 systems but requires the installation of the DIPOS operating system.

EMULATION OF IBM 3770: Specially designed for remote job entry, the program allows transmission of punched card batches, batches from disk files, and printout of received batches on the line printer. Both the IBM 3777 terminal Model 1 and 3777 terminal Model 3 can be emulated. Leased lines and dial-up lines may be used at transmission speeds up to 9600 bps. Communication with the host system is effected under SNA/SDLC control. The status of emulation (ONLINE/OFFLINE), a description of the current job, and the last entries are displayed on the screen. Jobs are started and stopped through the keyboard. IBM 3770 emulation requires only the standard 8860 operating system and is operable on all 8860 models.

EMULATION OF SIEMENS 8161: The 8860 system assumes the job of an 8171 cluster controller to facilitate communications with Siemens' mainframe units in the 7000 or 4004 series. The program runs under the control of the 8860 operating system and supports connection with the procedures MSV1 and LSV1. Several workstations can communicate at the same time. No changes to the 8161 programs, TP monitors, or access methods are necessary. The license program allows emulation of the 8171 controller, the 8161 display, and the 8121/8122. Connection can occur via leased or dial-up lines with maximum transmission speed of 9600 bps. The emulator supports the functions of the Transdata 814XX keyboard, and key assignment of the

▶ 8860 keyboard may be customer-specified at system genera-tion. This program is operable on all models of the Nixdorf 8860 Series.

EMULATION OF THE UNISYS U100/U200: Part of the System 8860 acts as a Unisys terminal multiplexer, thus allowing local or remote 8860 workstations to communicate with a System 9000, 400, or 1100. This program runs under the control of the 8860 operating system and supports connection to the Unisys mainframe with the procedure U100. No alterations are necessary to the U100/U200 pro-grams, TP monitors, or access methods of the mainframe. The license program allows emulation of the Unisys termi-nal multiplexer, the U100 and U200 displays, and the 800 printer. Connection can be made via leased or dial-up lines at maximum transmission rates of 9600 bps. The U100 communications procedure is employed in interactive mode with the 8860 system as passive partner. The emulator supports the functions of the U100 keyboard with full-format controls. Key assignments can be customer-specified at system generation. This program can operate on all models of the 8860 series.

8860 IN AN SNA NETWORK: The 8860 system can be defined for the IBM host as a physical unit (PU) Type 2. It can also represent several PUs and can communicate with several hosts simultaneously. Data transport on either leased or dial-up lines is effected by the PU, which provides data link control (SDLC), transmission control, and path control. Communication between the user program in the Nixdorf system (Secondary Logical Unit—SLU) and a pro-gram in the IBM host (Primary Logical Unit—PLU) is allowed by the following functions: session logon/logoff, management and recovery of sequence numbers, response sending (when the user program fetches the message), data flow control, SNA, bracket, quiesce, shutdown protocol, and chaining management.

ICL EMULATIONS: The Nixdorf 8860 provides emula-tion of the interactive features of the following ICL equipment:

- 7501 Terminal System running 61C4 or T2BX Terminal Executive,

- 7502 Terminal System running 62C5 or T2BX Terminal Executive,

- 7181 Terminal QLSA, and

- DRS20 Model 30 Terminal Cluster System.

Both Basic Mode Interactive (C01) and full XBM (C03) ICL protocols are supported. The 8860 system is connected to the ICL host as a remote terminal cluster. The physical link can be by dedicated or dial-up line with transmission speeds of up to 9600 bps. All standard keyboard functions available on an ICL terminal are duplicated on the standard Nixdorf alphanumeric keyboard. The keyboard layout and availabil-ity of functions can be selected for individual terminals. The functions of the DRS badge reader or 7181 PID device can be emulated by lockable keyswitches on the keyboard, by connection of a magnetic card reader, or by the entry of passwords prior to starting the emulation. The functionality of the emulation package is considerably extended by the provision of an interface to application programs running in the 8860. With suitable software, it is possible to access mainframe files to provide data for local 8860 applications.

PRICING

For pricing information, please contact Nixdorf. ■