NCR 8200 Series

MANAGEMENT SUMMARY

The NCR 8200 Series had its beginning in September 1974 with the introduction of the Century 8200, a computer designed for use either as an interactive system supporting order entry and accounts receivable or as a small-scale batch computer simulating the NCR Century 101 system. The processor used in the Century 8200 was an NCR 607, a modified version of the 605 minicomputer used in several of NCR's accounting and terminal control systems, including the NCR's accounting and terminal control announced a number of significant hardware and software enhancements that substantially upgraded the system's configurational possibilities and strengthened its interactive capabilities in certain industry application areas. By mid-1976, the Century 8200 has grown into a general-purpose multiterminal systems, and it became evident that there would be more to come.

In February 1977, NCR introduced the I-8250, a system that featured a repackaged 8200 processor, faster memory, more peripherals, new communications software, and improved operating system software. The I-8250 could be used either as a free-standing interactive multiprogramming system or as a communications-oriented processor. Like the 8200, the I-8250 supported up to seven interactive terminals, but the system similarities ended there. The I-8250 featured 800-nanosecond MOS memory in place of the 1200-nanosecond core memory on the 8200, twice the disk capacity of the 8200, floppy disk storage, magnetic tape drives, a wider range of printers, and significantly enhanced operating system software.

In May 1977, just three months after introducing the I-8250, NCR announced a new entry-level 8200 system, the I-8230. The I-8230 was aimed primarily at first-time ▷

NCR's 8200 Series of small business computers currently consists of the I-8231, the I-8251, and the I-8271. The 8200 Series is an outgrowth of the Century 8200, no longer manufactured. All models are interactive, multi-terminal systems that feature an operating system capable of executing multiple COBOL programs concurrently.

MAIN MEMORY: 64K to 512K bytes
DISK CAPACITY: 9.8 to 363.2 megabytes
WORKSTATIONS: Up to 5 on the I-8231, 24 on the I-8251 and I-8271.
PRINTERS: 50 to 900 lpm
OTHER I/O: Magnetic tape, punched card

CHARACTERISTICS

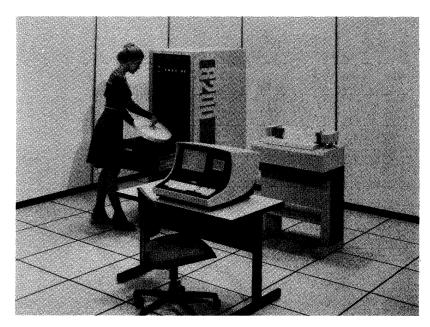**MANUFACTURER: NCR Corporation, 1700 S. Patterson Blvd., Dayton, Ohio 45409. Telephone (513) 449-2000.**

NCR is a leading manufacturer of business and banking equipment, maintaining 350 offices and 7 manufacturing facilities in the United States plus 650 offices in more than 100 other countries. The company also has manufacturing facilities in Dundee, Scotland; Augsburg, Germany; Oiso, Japan; Bulach, Switzerland; Massy, france; Waterloo, Canada; Puebla, Mexico; and Sao Paulo, Brazil.

MODELS: NCR I-8231, I-8251, and I-8271.

DATE ANNOUNCED: Second quarter of 1979.

DATE OF FIRST DELIVERY: Second quarter of 1979.

NUMBER INSTALLED TO DATE: I-8230 and I-8231, 1500; I-8250 and I-8251, 1350; I-8270 and I-8271, 400. ▶

The NCR I-8231, the entry-level system in the 8200 Series, can support up to five terminals and accommodate NCR's complete library of interactive multiprogramming application programs. A basic I-8231 system includes a CPU with 64K bytes of memory, 9.8 megabytes of fixed/removable disk storage, a magnetic tape cassette system, and one CRT display terminal. This system can be purchased for $22,245.

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computer users and was priced to compete with systems such as the Burroughs B 80 and B 800 and the IBM System/34. The I-8230 could be used as a free-standing computer or as a data processing workstation in a network of systems. An optional feature permitted both local and remote batch processing to occur at the same time. The I-8230 supported up to five terminals, one of which functioned as the operator console.

The I-8230 used the same processor found in the I-8250. A basic I-8230 system included the CPU with 64K bytes of main memory, 5 million bytes of disk storage, a magnetic tape cassette system, a CRT display terminal and keyboard, a 55-line-per-minute matrix printer, and two communications channels for additional CRT terminals. Optionally, the I-8230 could be expanded to include up to 96K bytes of main memory, a total of 40 million bytes of disk storage, line printers, flexible disk units, and magnetic tape handlers.

In December 1978, NCR announced a still larger member of the 8200 minicomputer family—the I-8270. The newcomer featured four times the memory and disk capacity of the I-8250. The I-8270 used the 6081 processor which started with 128K bytes of MOS memory, which was expandable to a maximum of 512K bytes in 64K-byte increments. An entry-level procesor included basic memory, a buffered common trunk, console interface, cassette interface, and one multichannel communications adapter. With the I-8270, a new operating system was also introduced. Called IMOS V, it was an extension of IMOS III. New peripherals to be used exclusively on the I-8270 became available, and it was possible to upgrade from an I-8230 to an I-8250 and on to an I-8270.

With the introduction of the new interactive systems, NCR stopped manufacturing the Century 8200.

In the second quarter of 1979, the I-8230, I-8250, and I-8270 were replaced by the currently offered I-8231, I-8251, and I-8271. The new I-8231 and I-8251 systems retain the identical configuration flexibility of their originals but offer a much easier migration path to the larger I-8271. The I-8271 combines the peripheral complement of the former I-8250 with the new processor and configuration flexibility of the original I-8270. With the release of IMOS V in the first quarter of 1980, the I-8271 can support 512K bytes of memory and 364 megabytes of disk storage through a combination of 6560/6566/6530 drives.

Options for the systems include from one to five CRT's on the I-8231 and from one to twenty-four on the I-8251 and I-8271. The I-8231 can support up to five printers, and the I-8251 and I-8271 can support up to 24 printers. Band printers for the three systems include 200/300/600-lpm models and a 900-lpm model is available for the I-8271. Every system requires at least one common trunk printer, matrix or band. Reel-to-reel and cassette tape drives and a card reader are also offered.

DATA FORMATS

BASIC UNIT: 8-bit byte or 2-byte word. Each byte can represent one alphanumeric character, one unpacked or two packed BCD digits, or eight binary bits.

FIXED-POINT OPERANDS: One word.

FLOATING-POINT OPERANDS: None.

INSTRUCTIONS: One, two, or three words.

MAIN STORAGE

TYPE: MOS.

CYCLE TIME: 800 nanoseconds.

CAPACITY: NCR I-8231—64K to 96K bytes in 16K-byte increments; NCR I-8251—64K to 128K bytes in 16K-byte increments; NCR I-8271—128K to 512K bytes in 64K-byte increments.

CHECKING: One parity bit per byte is generated during writing and checked during reading.

STORAGE PROTECTION: Battery backup is optional.

RESERVED STORAGE: 40K bytes of memory are reserved for the operating system.

CENTRAL PROCESSOR

GENERAL: The processor used in the 8200 series systems is the NCR 6081 miniprocessor.

CONTROL STORAGE: None.

REGISTERS: There are no registers accessible to the user.

INDIRECT ADDRESSING: None.

INDEXING: None.

INSTRUCTION REPERTOIRE: From the user's view-; point, the instruction repertoire is effectively that of the COBOL language.

INSTRUCTION TIMINGS: Add time, the only example supplied by NCR, is 2.4 microseconds.

INTERRUPTS: All processor have 8 external priority interrupt levels.

PHYSICAL SPECIFICATIONS: The 8200 CPU's house the processor, memory, cassette, and disk in a single high-boy cabinet measuring 60 inches high, 24 inches wide, and 36 inches deep.

Operating environment for the systems can range from 60 to 90 degrees Fahrenheit, at 10 to 80 percent relative humidity. Power requirement is a 220-VAC, 60-Hz, 20-ampere, four-wire circuit.

INPUT/OUTPUT CONTROL

I/O CHANNELS: The processor-peripheral interface is through one of 8 common ports (5 on the I-8231). Up to 8 peripheral positions may be available at a port, depending on the type of controller or interface installed. The ports and positions logically available are normally defined during system generation. A given position is then selected by processor logic under program control.

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PERIPHERALS/TERMINALS

DEVICE	DESCRIPTION & SPEED	MANUFACTURER
7621-0101	Magnetic Tape Cassette; one integrated unit std., one opt.; 7.5 ips, 800 bpi, 327K bytes on 2 tracks (80-char. blocking), 8-bit ANSI standard serial recording; 0.750 KBS	—
6560-0402	Cartridge Disk Drive; one integrated unit std., one opt.; see Mass Storage	NCR
0796-0101	CRT Display; 512/1920 characters, 16 lines by 32 characters/24 lines by 80 characters; all characters 7 x 9 dot matrix, 64 ASCII character set; 110-9600 bps	NCR
MAGNETIC TAPE EQUIPMENT		
7330-0101, -0102	9-track, NRZI, 800 bpi, 7.5-inch reels, 12.5 ips, free-standing; 7330-0102 is rack-mounted (8250 only); 10 KBS	NCR
7330-0201, -0202	9-track, PE, 1600 bpi, 7.5-inch reels, 12.5 ips, free-standing; 7330-0202 is rack-mounted (8250 only); 20 KBS	NCR
	Free-standing version of 7330-0101; available on 8230 and 8250	NCR
	Free-standing version of 7330-0201; available on 8230 and 8250	NCR
PRINTERS		
0260-7000	Thermal; KSR	NCR
0260-8000	Thermal; Receive only	NCR
6420-2101	Band; 132 positions, 48 (64, 96 opt.) character set, 10 (10/15 opt.) charcters per inch, 6 or 8 lines per inch, 4 to 16.75-inch-wide paper, full-line buffer; 300 lpm	NCR
6420-2201	Band; 132 positions, 64 character set, 10 characters per inch, 6 or 8 lines per inch, 4 to 16.75-inch paper, full-line buffer; 600 lpm	NCR
6420-2401	Band; 132 positions, 48 (64 opt.) character set, 10 characters per inch, 6 or 8 lines per inch, 4 to 16.75-inch-wide paper, full-line buffer; 200 lpm	NCR
6420-0301	900-lpm version of 6420-2201; for I-8271	NCR
6440-0202	Serial matrix; 132 positions, 64 character set, 3-channel VFU, 6 (6/8 opt.) lines per inch, 4 to 16.5-inch paper, 7 x 7 (9 x 7 opt.) dot matrix, compressed pitch opt., audible alarm opt., 10 characters per inch, dual print heads; bidirectional printing at about 125 lpm (83 lpm with 9 x 7 characters)	Computer Peripherals Inc.
6440-0302	Same as 6440-0202 but single print head; bidirectional printing at about 70 lpm (40 lpm with 9 x 7 characters)	Computer Peripherals Inc.
6440-0402	Serial matrix; 132 positions, 7 x 7 dot matrix, 10 characters per inch, 6 lines per inch, paper width 4 to 16.5 inches, 64 character set, 3-channel VFU; 173 cps; about 50 lpm	Computer Peripherals Inc.
PUNCHED CARD EQUIPMENT		
0368-0100	Reader; 80-column, photoelectric, serial, 1000-card input hopper and output stacker; 300 cpm	NCR
TERMINALS		
0796-0101	CRT display/keyboard; 1920 characters, 24 lines by 80 characters, 5 by 7 dot matrix characters, 64 character set, standard typewriter keyboard with separate 10-key numeric pad, TTY compatible	NCR

▷ The NCR 8200 systems are fully upward-compatible. The systems can use the complete line of application programs developed for the Century 8200 as well as programs developed for NCR Century Series mainframe computers. Numerous industry standard applications programs have also been tailored for virtually every business environment. NCR I-8231 systems can be upgraded to I-8251 or I-8271 systems, and I-8251's can be upgraded to I-8271's. In addition, originally installed I-8230 and I-8250 systems can be field upgraded to the new I-8271.

The Interactive Multiprogramming Operating Systems (IMOS, IMOS III, and IMOS V) used with the systems are designed to establish an operating environment capable of containing and concurrently executing multiple COBOL programs or system processes (COBOL compilation, text editing, sorting, etc.). Each job works with its assigned system resources, creating a multiprogramming environment specifically designed to permit direct data entry and ▷

▶ A "common trunk" is standard. It is connected to the processor through port 3 and is used for slower I/O devices such as the line printer, flexible disk, magnetic tape, and card reader.

Three modes of data transfer are possible. Direct Memory Access (DMA) is used for data transfer to or from disk at all times and from cassette during program loading. After it is begun, DMA is independent of processor control, releasing processor time to other peripherals. Automatic Data Transfer (ADT) is used by most of the other peripherals. ADT is under control of the processor after program-processor selection of the peripheral; the rate of data transfer depends on the peripheral. The third mode, Programmed Data Transfer (PDT), is used for special-purpose requirements. Processing speed during PDT depends on software program logic.

SIMULTANEOUS OPERATIONS: Only one device at a time can transfer data over the common trunk, but simultaneous operation of the common trunk with integrated peripherals of DMA peripherals is possible at a total data rate not exceeding 833,000 memory cycles per second. ▶

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▷ batch processing invoked from either local or remote operator stations. A job is assigned its system resources prior to running and, when it terminates, its assigned resources are released. System execution time is divided among active user jobs via a round-robin, interrupt-driven technique, which treats all user jobs with equal priority.

Included with IMOS is a one-pass compiler that executes as a user job and is written to accept NCR IMOS COBOL statements. Also available to support the preparation and modification of COBOL source programs are the Text Editor and the IMOS Application Customizer. The source code for a COBOL compilation can come from a disk file, cassette file, or punched card file. The object code produced by the compiler is executed interpretively. The interpreter, which is memory-resident only when a COBOL program is being executed, is shared among the various COBOL user programs coexisting in memory.

NCR offers a number of application packages for use on the 8200 systems. These include applications for manufacturing companies, wholesale distribution firms, health-care facilities, government offices, schools, financial institutions, and retail stores.

USER REACTION

Datapro received 40 responses from users of NCR's 8200 Series in our 1980 user survey. The 40 users reported a total of 75 systems in use.

The businesses represented by the responses included a teachers retirement association, D.P. consultants, an electric co-op, an airport commission, a CPA, a savings and loan, hospitals, manufacturers of a number of different products, a publisher, a drilling company, a college, a lumber supplier, a natural gas company, a Beechcraft dealer, a school district, a medical/health care group, and others.

The most reported application was in the field of accounting (thirty users), and the next most popular was payroll and personnel (nineteen users). Other applications reported by from one to nine users included manufacturing, construction, banking and finance, transaction processing, medical/health care, utilities/power, data entry, government, program development, cost estimating, inventory control, and retail.

The applications programs were ready-made products from NCR in twenty-five instances. In-house personnel had written programs for seventeen users, and nineteen users reported contract or proprietary programming as other sources. COBOL was the programming language listed on thirty-three returns.

The average system had been in use for twenty-seven months and had 116K bytes of memory, and an average of 2.3 workstations on line. Thirty-two systems had been purchased, thirty-five were being leased, and eight were rented. There were 94 printers in use. ▷

▶ ## CONFIGURATION RULES

Memory for the I-8231 can be expanded from the basic 64K bytes of 96K bytes in increments of 16K bytes, and for the I-8251 from 64K bytes to 128K bytes, also in 16K-byte increments. For the I-8271, memory can be expanded from 128K bytes to 512K bytes in 64K increments.

The control console occupies one multiplexer port, as does the single or dual cassette drive unit. Two line or matrix printers, in any combination, two tape drives, and one card reader can be attached to the common trunk, which occupies one multiplexer port.

WORKSTATIONS: Up to 24 local and/or remote CRT's and printers can be connected. At least one must be local. Each CRT and each printer counts as one device. Terminals are attached via multi-channel communications adapters, One adapter is included with the basic processor. The terminals occupy one to four multiplexer ports. The maximum number of CRT's that can be on line in an I-8131 system is 5, and on an I-8251 and I-8271 system, 24. Up to 24 CRT's are made available by daisy-chaining MCCA boards and by utlizing an optional auxiliary card cage in those cases where power requirements exceed capacity.

DISK STORAGE: On the I-8231 system, up to four disk drives in any combination can be attached. Disk drive capacity thus ranges between 9.8 million bytes and 39.2 million bytes. All four disks are handled by an integrated controller attached to one multiplexer port. On the I-8251 system, a second integrated controller, also capable of handling up to four disk units, can be installed, thus providing a maximum disk storage capacity of 78.4 million bytes. The I-8271 system can support up to eight disk drives, including a maximum of four 6530's and four 0656 or 6566 drives in any combination, thus the maximum disk capacity on an I-8271 system is 363.2 million bytes.

MAGNETIC TAPE UNITS: A maximum of two on any I-8200 system, via the common trunk.

PRINTERS: See WORKSTATIONS above.

MASS STORAGE

0656-0401 CARTRIDGE DISK DRIVE: A free-standing unit with one fixed and one removable cartridge, each with a data capacity of 4.9 million bytes. The average access time is 35 milliseconds, and the data transfer rate is 312K bytes per second.

6560-0402 CARTRIDGE DISK DRIVE: Same as the 0656-0401 above, but integrated into the CPU cabinet.

6560-0412 CARTRIDGE DISK DRIVE: A 4.9-million-byte version of the 6560-0402; the fixed and removable disks are each initialized at half capacity.

6560-0422 CATRIDGE DISK DRIVE: An integrated unit with one removable cartridge with a data capacity of 4.9 million bytes. Same specifications as the 0656-0401.

6566-0402 DISK DRIVE: An integrated disk drive using two fixed disks with a total storage capacity of 9.8 million bytes. The average access time is 70 milliseconds, and the data transfer rate is 312K bytes per second.

6566-0412 DISK DRIVE: A 4.9-million byte version of the 6566-0402. The unit is the same as the 6566-0402, but the upper disk is disabled.

6530-0201 DISK DRIVE: An integrated disk drive with a 13.5-megabyte removable disk cartridge and a total storage capacity of 54 megabytes. The average access time is 38.3 ▶

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SYSTEM SOFTWARE STORAGE REQUIREMENTS

	Main Memory		Disk Storage	
	Minimum	Typical	Minimum	Typical
IMOS III	40KB	43KB	0.5MB	0.5MB
IMOS III COBOL	13KB	13KB	*	*
IMOS III Utilities	*	*	*	0.3MB
IMOS V (including utilities)	88KB	96KB	0.5MB	0.5MB
IMOS V COBOL	13KB	13KB	*	*

*Included in IMOS operating system requirements.

▷ The ratings assigned by these forty NCR 8200 Series users are tabulated below.

	Excellent	Good	Fair	Poor	WA*
Ease of operation	16	19	3	1	3.3
Reliability of mainframe	21	14	3	1	3.4
Reliability of peripherals	9	19	9	2	2.9
Maintenance service:					
Responsiveness	11	21	7	1	3.1
Effectiveness	6	20	11	2	2.8
Technical support:					
Trouble-shooting	3	14	17	5	2.4
Education	1	19	14	5	2.4
Documentation	2	15	15	8	2.3
Manufacturer's software:					
Operating system	2	24	12	2	2.7
Compilers and assemblers	6	20	10	0	2.9
Applications programs	3	18	10	2	2.7
Ease of programming	6	20	8	1	2.9
Ease of conversion	2	18	10	4	2.5
Overall satisfaction	5	24	7	4	2.8

*Weighted Average on a scale of 4.0 for Excellent.

The systems' advantages receiving the highest praise were the response time (thirteen users) and the systems' ease of expandability and reconfiguration (nineteen users). The software and hardware compatibility with other systems was a significant advantage to a number of users as were also the power/energy efficiency, the productivity aids, and the database language. Other users were pleased that the costs had turned out to be less than they had expected and that the delivery of the equipment and software had been ahead of schedule. One respondent added that his system "handles our volume of work and will handle more," and another described his as an "excellent first system."

On the reverse side of the coin, eleven users reported that the delivery or installation of their hardware had been late, ten users' proposed systems had proven to be too small and had been replaced or expanded, and nine users' reported that required software had been late. Other problems encountered were costs which exceeded expectations, failure of the vendor to provide the promised software or support, noisy systems, and difficulty in keeping up with the vendor's enhancements or changes to hardware and ▷

▶ milliseconds, and the data transfer rate is 1.2 megabytes per second. For use on the I-8271 only.

6530-0301 DISK DRIVE: An 81-megabyte version of the 6530-0201 with a 13.5-megabyte removable disk cartridge and 67.5 megabytes of fixed storage. For use on the I-8271 only.

6530-2301 DISK SUBSYSTEM: A subsystem created by packaging one 6530-0201 and one 6530-0301 in order to provide the increased performance available from dual spindles and increased removable storage (two 13.5-megabyte cartridges). For use on the I-8271 only.

INPUT/OUTPUT UNITS

See Peripherals/Terminals table.

COMMUNICATIONS CONTROL

The 6080-K170 Multi-Channel Communications Adapter (MCCA) can support either three remote or local CRTs or 50/70-lpm matrix printers. Transmission is asynchronous at 300, 1200, 2400, 4800, or 9600 bps. Bell System 202C, 202T or equivalent modems are accommodated. The modem interfaces directly with the MCCA. The remote terminals are supported in the same manner as local terminals; the only difference will be slower responses.

The 6080-K113 Synchronous Message Level Adapter provides half-duplex communications at up to 9600 bps using IBM Binary Synchronous line protocol. A software package, Remote Batch Communications, is available for dedicated or concurrent operation of an 8200 system as a remote batch terminal emulating an IBM 2780/3780 terminal.

SOFTWARE

OPERATING SYSTEM: The Interactive Multiprogramming Operating System (IMOS, IMOS III, IMOS V) is designed to establish an operating environment capable of containing and concurrently executing multiple COBOL programs or system processes. Each job works with its assigned system resources, creating a multiprogramming environment specifically designed to permit direct data entry and batch processing invoked from either local or remote operator stations. A job is assigned its system resources prior to running and, when it terminates, its assigned resources are released. System execution time is divided among active user jobs via a round-robin, interrupt-driven technique, which treats all user jobs with equal priority.

IMOS consists of memory-resident modules and modules that are called in from the disk as needed. Routines that reside in memory include the interrupt service routines, the scheduler, the I/O control routines, the time processing ▶

▷ software. Specific complaints were that the "conversion was rough and took a long time" and "software was not thoroughly debugged."

Twenty-seven of the forty said that they would recommend the 8200 Series to other users.□

▶ routines, the primary system command processor and loader, the task manager, the resource manager, and the error recovery routines. The non-resident portions of the IMOS are primarily confined to those needed to support the remainder of the System Command Processor and COBOL Runtime Interpreter. These modules are loaded into memory by the resident loaders. The Runtime Interpreter is sharable by co-resident COBOL programs; the System Command Processor modules are not sharable.

IMOS treats all user memory and system peripherals, excluding CRT's, as assignable system resources. Of these system resources, only card reader and cassette input files cannot be shared among user jobs. All resources, excluding memory, are requested and, if available, assigned to a user job. The assignment lasts until the job finishes using the resource or the job terminates. Once the resources are released, they are free to be assigned/allocated to the next requester. Memory is allocated in the increments in which it is needed. User program memory is assigned under control of the Dynamic Storage Allocation subsystem and need not occupy large contiguous blocks of memory.

All peripheral resources are assigned and user jobs requested by the terminal users through the IMOS System Command language. The requests are executed in the same priority for all terminals. The Primary System Command Processor and loaders are resident for the purpose of calling for the non-resident routines to service the user requests.

Data files created under IMOS on NCR 8200 systems can be used as is under IMOS III on I-8231 and I-8251 systems. COBOL programs created under IMOS, however, must be recompiled to restructure the object programs into local and global sections for running under IMOS III. IMOS control strings must be converted to the IMOS III system command set. NCR provides a conversion program to aid in this process.

IMOS V must be used on an I-8271 if memory is to be expanded above 128K bytes or if the 6530 disk drives are to be used.

LANGUAGES: Included with the IMOS software is a one-pass compiler, which executes as a user job, written to accept NCR IMOS COBOL statements. Also available to support preparation/modification of COBOL source programs are the Text Editor and IMOS Application Customizer. The source code for a COBOL program can come from a disk file, cassette file, or punched card file. The object code produced by the compiler is executed interpretively. The interpreter, which is memory-resident only when a COBOL program is being executed, is shared among the various COBOL user programs coexisting in memory.

Programs compiled by the IMOS COBOL compiler are segmented into local and global portions. Basically, the Procedural Division and all constants and literals from the Data Division are global elements; all other elements are considered local. The connotation of a global program segment is that it need reside only once in memory and can be shared among all users of that program. Local segments must be loaded for each user. This program segmentation technique optimizes the use of memory for users who execute the same COBOL program from multiple CRT's, as would be the case in a data entry system.

Also included in the IMOS COBOL implementation is the ability to CALL subprograms from the main program or other subprograms and then return via an EXIT routine. Various main programs/subprograms can share subprograms and thereby effect interprogram communication through the parameter blocks passed by the various users.

Two versions of BASIC are available on NCR's 8200 systems: NCR IMOS BASIC and NCR IMOS Extended BASIC. NCR IMOS BASIC is an implementation of ANSI Minimal BASIC, as defined in the American National Standard for Minimal BASIC, ANSI X3.60-1978. NCR IMOS Extended BASIC is an extended version of ANSI Minimal BASIC which, except for a few implementation differences, is source- and execution-compatible with NCR DPS BASIC on NCR's 8100 systems. BASIC uses an interpreter with its own editing features, allowing the user to enter or modify his program and then run it without having to leave the interpreter. Debugging procedures are available to help the programmer find the sources of problems. Sequential and relative files written in ASCII by a COBOL program can be accessed by a BASIC program and vice versa.

UTILITIES: Included with the IMOS software are system generator, disk initializer, sort, and file copy routines.

APPLICATIONS PROGRAMS: A number of specialized industry packages are currently offered by NCR for use on the 8200 Series systems, including the following:

The *Interactive General Accounting System (IGAS)* consists of four integrated applications that can be tailored in any combination to handle the accounting needs of virtually any business. IGAS consists of Accounts Receivable, Accounts Payable, Payroll, and General Ledger modules. The Accounts Receivable application prepares billing statements, processes payments received, and produces exception reports that facilitate collection. The Accounts Payable application keeps track of liabilities to vendors and maintains a file of open invoices for cash requirements analysis and selective payment. The Payroll module, which can be interfaced with General Ledger, allows hourly and salaried employees to be processed according to any of six regular and exception classifications, handles taxes, processes fixed and voluntary deductions, and produces government reports. The General Ledger application is independent of a specific chart of accounts or fiscal year format, enabling the user to fit it to his particular informational and operational needs. History can be maintained for 13 or 26 periods, and individual accounts are combined for consolidated reporting on operating statements and balance sheets.

The *Interactive Financial Management System (IFMS)* consists of two independent programming packages intended for educational or governmental installations that use budgetary accounting techniques. The *Fund Accounting System* consists of three modules; Budgetary, Expenditure and Revenue Accounting, and General Ledger. The second package is *Payroll.* The Payroll package provides interactive entry of current pay period information and file maintenance, but update of cumulative employee totals is performed in batch mode after verification of pay period input. IFMS runs under IMOS and requires a minimum configuration including 64K bytes of memory, one CRT, one 9.8-million-byte fixed/removable disk drive, and one 50-lpm matrix printer. Additional disk storage, more CRT terminals, and faster printers can be accommodated. Additional main memory will typically be required to accommodate additional terminals.

The *Interactive Wholesale Distribution System (IWDS)* is constructed from six application modules, which can operate concurrently in different memory partitions. The application modules are Order Processing and Sales Analysis, Inventory Control, Accounts Receivable, Payroll, Accounts Payable, ▶

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and General Ledger. Subsets of the six modules can be implemented. The Order Processing module accepts and validates customer orders, applies the orders to the data files, and generates associated output reports. The General Ledger module maintains an integrated accounting data base and creates reports that depict financial positions; this module is interfaced with the five other modules and with its own asset module. IWDS requires a 64K-byte system, one integrated cassette tape drive, at least 9.8 million bytes of disk storage, one CRT per partition, a line printer, and one asynchronous communications adapter.

The *Interactive Manufacturing Control System (IMCS)* uses multiprogramming to time-share processing and file access. Up to seven separate entry, inquiry, and updating operations can be serviced at one time, and terminals can be switched from one operation to another as peak activity dictates. IMCS includes order processing/sales analysis, inventory control, and planned receipts modules.

The *Sales Processing Interactive Realtime Inventory Technique (SPIRIT)* is a management tool for wholesalers, distributors, and manufacturers. The system employs direct data entry on up to 400 CRT's and interactive processing for order entry; order, inventory, and customer inquiry; ticket picking; invoicing; price changes; stock receipts; and accounts receivable. SPIRIT can handle order entry, inquiry, and accounting for single or multiple warehouses. The CRT's and matrix printers may be local or remote.

The *School Automated Record System (SCHOLARS)* is a management information system consisting of a series of application modules to gather, analyze, and report all phases of student records. The control and databank modules are mandatory elements of the system, but other modules may be implemented as required; they include student scheduling, grade reporting, attendance reporting, test evaluation, and academic history.

The *Interactive Moving and Storage System (IMSS)* was developed especially for local agents of national van line organizations. It includes a series of integrated on-line modules interfaced to a general ledger system. Sales processing, accounts receivable, storage billing, sales reporting, packing material inventory, and van line reconciliation compose the nucleus of the system. Supplemental accounting modules can be added as needed to handle order processing, accounts payable, and payroll.

The *Interactive Beer Distribution System (IBDS)* includes modules for order processing, route settlement, inventory control, and sales analysis reports. It is designed to operate as an interactive system that interfaces to accounts receivable and general ledger applications.

The *Interactive Food Distribution System (IFDS)* is a management information and accounting system tailored to the needs of the wholesale food distributor. The order processing, inventory control, accounts receivable, and sales analysis modules compose the nucleus of the system. By interfacing IFDS to the accounts payable and general ledger modules and the general accounting system payroll module, the food distributor can operate in a total data processing environment.

PRICING

POLICY: The NCR 8200 Series systems are available for purchase, on a one- or three-year rental agreement, or on an NCR-financed lease agreement. The prices include initial installation; upgrades or other configuration modifications will incur installation charges.

Purchase prices, monthly rentals on a three-year agreement, and monthly maintenance prices are shown in the accompanying pricing information. One-year rental prices are about 15 percent higher than the three-year prices shown.

Included in the purchase or rental prices are 40 hours of on-site operator training, 16 hours of test and compile time, and a complete library of reference material.

NCR warrants the 8200 series systems for 90 days. After this period expires, maintenance service is available at monthly rates. Maintenance is performed by NCR field engineering personnel. Approximately 417 service points staffed by 9,000 qualified field engineers are located throughout the United States, and there are more than 700 NCR sales and service offices located in 120 countries throughout the world.

Maintenance rates include both preventive and remedial maintenance. Preventive maintenance is performed between 8:00 a.m. and midnight, exclusive of Sundays and holidays. Remedial maintenance entitles the customer to 16-hour coverage (8:00 a.m. to midnight), Monday through Friday. Additional scheduled maintenance is available at increased rates. Users should consult an NCR representative for these prices.

The Investment Tax Credit is passed on to users who elect a three-year rental agreement. However, delivery of new equipment cannot be guaranteed unless the customer pays the 10 percent purchase option deposit, for which he receives full credit if the option is exercised within 24 months.

EQUIPMENT: The components and prices of packaged configurations of the NCR 8200 systems are listed in the Equipment Prices section that follows. ■

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly Rental (3-year)*
SYSTEMS				
8231	CPU with 64K bytes of memory, 9.8 megabytes of fixed/removable disk storage, CRT display terminal, cassette and interface, integrated disk controller, multi-channel communications adapter, buffered common trunk	$22,245	$119	$820
8251	CPU with same equipment as 8231	24,245	119	850
8271	CPU with 128K bytes of memory, CRT display terminal, cassette and interface, multichannel communications adapter, buffered common trunk, memory extension kit	16,500	30	686
6080-K121	Battery backup	1,800	4	38

*Rental prices include maintenance.

NCR 8200 Series

		Purchase Price	Monthly Maint.	Monthly Rental (3-year)*
MEMORY				
6081-P202	64K to 80K memory upgrade	1,000	3	30
6081-P203	80K to 96K memory upgrade	1,000	3	30
6081-P204	96K to 112K memory upgrade	1,000	3	30
6081-P205	112K to 128K memory upgrade	1,000	3	30
6081-P300	Memory extension kit, required to address memory above 128K on 8271 system	1,500	10	42
6081-P301	128K to 192K memory upgrade, required to utilize IMOS V on 8271 system	4,000	11	119
6081-P302	192K to 256K memory upgrade	1,500	4	51
6081-P303	256K to 320K memory upgrade	1,500	4	51
6081-P304	320K to 384K memory upgrade	1,500	4	51
6081-P305	384K to 448K memory upgrade	1,500	4	51
6081-P306	448K to 512K memory upgrade	1,500	4	51
MASS STORAGE				
0656-0401	Free-standing cartridge disk drive; 9.8 megabytes, fixed/removable	11,500	104	340
6530-0201	Integrated cartridge disk drive, 54 megabytes, fixed/removable, for 8271 only	14,500	75	374
6530-0301	Integrated cartridge disk drive, 81 megabytes, fixed/removable, for 8271 only	16,000	80	412
6530-2301	Cartridge disk subsystem, 135 megabytes, fixed/removable, for 8271 only	25,700	145	667
6530-P301	135 megabyte to 162 megabyte upgrade	6,300	15	157
6560-0402	Integrated cartridge disk drive; 9.7 megabytes, fixed/removable	10,650	94	319
6560-0412	Integrated cartridge disk drive; 4.9 megabytes, fixed/removable	9,500	79	280
6560-0422	Integrated cartridge disk drive; 4.9 megabytes, removable	9,500	79	280
6566-0402	Integrated cartridge disk drive; 9.8 megabytes, fixed	5,000	23	149
6566-0412	Integrated cartridge disk drive; 4.9 megabytes, fixed·	3,000	15	98
7640-0101	Free-standing diskette drive, single spindle; 250K bytes	1,950	25	77
7640-0201	Free-standing diskette drive; dual spindle; 500K bytes	2,450	30	93
7640-0301	Rack-mounted diskette drive, single spindle, 250K bytes; cannot be used on 8231	1,950	25	77
7640-0401	Rack-mounted diskette drive, dual spindle, 500K bytes; cannot be used on 8231	2,450	30	93
7640-K001	Diskette controller	1,400	5	38
7640-K002	Diskette single spindle to dual spindle upgrade	800	5	31
MAGNETIC TAPE EQUIPMENT				
7622-P101	Second integrated cassette tape unit	1,850	5	42
7330-0101	Reel-to-reel drive; 9-track, 800 bpi, free-standing	8,000	48	208
7330-0102	Same as 7330-0101, but rack-mounted	8,000	48	208
7330-0201	Reel-to-reel drive; 9-track, 1600 bpi, free-standing	12,000	63	326
7330-0202	Same as 7330-0201, but rack-mounted	12,000	63	326
PRINTERS				
0260-7000	Thermal, KSR	2,995	28	82
0260-8000	Thermal; RO, for use with 0796-0101 CRT	2,495	25	85
6420-2101	Band; 300 lpm	9,220	76	263
6420-0301	Baud; 900 lpm; for 8271 only, includes quietized cabinet	26,500	250	820
6420-2201	Band; 600 lpm	13,720	150	531
6420-2201	Band; 200 lpm	8,020	67	221
6420-K010	64-character English Print Band	330	—	21
6420-K019	96-character ASCII/USA Print and, U/L case	330	—	21
6420-K020	15-character-per-inch font feature	330	—	21
6420-K021	64-character OCR-A Print Band	330	—	21
6420-K022	48-character ASCII/USA Print Band	330	—	21
6420-K024	Quietized Cabinet	550	—	30
6420-K030	Common Truck Interface	1,500	5	30
6440-0202	Serial Matrix; 64 character set, 125 lpm	6,600	60	183
6440-0302	Serial Matrix; 64 character set, 70 lpm	4,650	55	153
6440-0402	Serial matrix; 64 character set, 50 lpm	3,995	39	132
6440-K030	Common trunk interface for 6440-0202 or -0302	500	5	17
6440-P030	Common trunk interface for 6440-0402	500	5	17
6440-K010	Tear Bar, 8.5 inches	90	—	8
6440-K043	Combined feature package of audible alarm, 6 or 8 lines per inch, and compressed pitch; for 6440-0202 or -0302	115	—	4
6440-K045	Paper Basket; for the 6440-0202, -0302, or -0402	110	—	—
6440-K058	USA character set with 9 x 7 dot matrix, 96 characters, U/L case	105	—	3
1001-A003	Pedestal for 6440-0202, -0302, or -0402	275	—	—

A common trunk printer must be ordered with every system.

*Rental prices include maintenance.

NCR 8200 Series

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly Rental (3-year)*
PUNCHED CARD EQUIPMENT				
0368-0100	Card Reader; 80-column, 300 cpm	4,500	29	136
TERMINALS				
0796-0101	CRT; 1920 characters, TTY compatible	2,000	25	76
7900-1102	CRT, NCR 7900 Model I, TTY compatible	2,000	25	81
6080-K113	Synchronous Message Level Adapter	1,500	10	51
6080-K170	Multichannel Communication Adapter	1,010	8	30
HARDWARE				
0902-0058	CRT Stand/Matrix Printer Table	195	—	—
0902-0059	Storage Shelf	25	—	—
UPGRADES				
6081-P100	I-8231 to I-8251	3,000	—	—
6081-P702	I-8231 to I-8271	7,000	20	—
6081-P703	I-8251 to I-8271	3,000	14	—

*Rental prices include maintenance.

SOFTWARE PRICES

		One-Time License Fee	Monthly License	Annual Support Charge
SYSTEMS SOFTWARE				
8060-0601	IMOS I & Utilities	$ 5,200	$130	$228
8060-0602	COBOL 74 Compiler (IMOS I)	1,680	35	72
8060-0501	Remote Batch Communication (Free-standing)	1,105	23	72
8060-0101	NCR Century 101 Simulation	2,785	58	108
8060-0701	IMOS III Operating System	3,800	95	168
8060-0702	IMOS III Utilities	1,400	35	60
8060-0703	COBOL 74 Compiler (IMOS III)	1,680	58	96
8060-0704	Concurrent Remote Batch Communications	2,785	58	96
8060-1201	IMOS V Operating System	4,950	110	204
8060-1202	IMOS V Utilities	1,575	35	60
8060-1203	IMOS V BASIC	1,360	34	108
8060-1204	IMOS V Extended BASIC	1,880	47	144
8060-1207	IMOS V COBOL 74	1,680	35	72
8060-1208	Concurrent Remote Batch Communications (IMOS V)	2,785	58	96
INTERACTIVE HEALTH CARE INFORMATION SYSTEM				
8073-0301	Inpatient Processing	1,680	35	120
8073-0302	Outpatient/Clinic Processing	1,375	33	120
8073-0303	Patient Accts. Receivable	1,680	40	120
8073-0307	Inpatient Proration Extension	265	6	120
INTERACTIVE FINANCIAL MANAGEMENT SYSTEM				
8075-0201	Fund Acctg. System	3,360	70	120
8075-0202	Fin. Mgmt. System Payroll	2,160	53	NA
INTERACTIVE WHOLESALE DISTRIBUTION SYSTEM				
8071-0301	Order Processing/Sales Analysis	4,750	116	T&M
8071-0302	Inventory Control	2,905	70	T&M
INTERACTIVE MANUFACTURING CONTROL SYSTEM				
8069-1001	Order Processing/Sales Analysis	5,545	135	T&M
8069-1002	Inventory Control	2,905	70	T&M
8069-1003	Planned Receipts	790	20	T&M

NCR 8200 Series

SOFTWARE PRICES

		One-Time License Fee	Monthly License	Annual Support Charge
EDUCATIONAL APPLICATIONS				
8074-0601	8200 Scholars	5,060	160	T&M
INTERACTIVE MOVING & STORAGE SYSTEM				
8072-0101	Basic Moving & Storage System	4,490	109	T&M
8072-0102	Accounts Payable	790	20	T&M
8072-0103	Payroll	1,850	45	T&M
8072-0104	Order Processing	790	20	T&M
WHOLESALE APPLICATIONS				
8071-0201	SPIRIT-Sales Analysis	1,075	NA	NA
8071-0202	SPIRIT V	11,880	263	T&M
8071-0401	Interactive Beer Distribution System	6,470	160	T&M
8077-0102	Interactive Food Distribution System	10,900	268	T&M
IMOS COMMERCIAL BANK APPLICATIONS				
8065-0101	DDA	4,910	109	T&M
8065-0102	Regular Savings	1,905	42	T&M
8065-0103	Certificate of Deposit	1,905	42	T&M
8065-0104	General Ledger	1,100	25	T&M
MISCELLANEOUS APPLICATIONS				
8078-0101	Hospitality Payroll	3,745	89	NA
8075-0501	Interactive Utility Billing System	3,300	NA	NA
8074-0501	School Bus Scheduling System	2,200	84	NA
8074-0401	Interactive Stores Inventory Control System	2,750	NA	T&M
8064-0901	Free-standing Payroll	2,110	44	T&M