

NCR Century Series

MANAGEMENT SUMMARY

The present family of NCR Century Series computers includes five disc-oriented models released over a period of four years. From the middle-of-the-range Century 100 and 200 processors (announced in March 1968) and the new Century 101 (released in April 1972) to the larger Century 300 (announced in September 1970) and the smaller Century 50 (unveiled in December 1970), the Century Series offers a broad range of upward-compatible systems.

While the Century 50 and 100 both offer about the same level of internal performance, the Century 300 is more than 25 times as powerful as either smaller system. The Century 101 and 200 have about 2.5 and 5 times the internal performance of the low end of the line, respectively.

As originally introduced, the Century Series represented a belated but impressive entry into the third-generation computer sweepstakes, with an appropriate complement of peripheral equipment and software for the hotly contested small-scale business data processing marketplace. Early announcement of a larger, more powerful processor was promised at the time the Century 100 and 200 were announced, but it was more than two years before the third, most powerful member of the family was released.

At the time of its release, as now, the long-promised Century 300 processor provided a natural growth path for installed Century 200 systems, and has done its share to promote acceptance of the smaller Century 100 and 200 systems by tangibly demonstrating that upward growth with full compatibility with the earlier models is a reality.

The low end of the Century Series product line was set by the December 1970 unveiling of the Century 50, which >

NCR's Century Series computers span a wide range of computational capability from the small-scale Century 50 to the large-scale Century 300. Recently, a heavy volume of activity has streamlined this upward-compatible family of business-oriented systems with a new processor (the Century 101) plus numerous changes.

CHARACTERISTICS

MANUFACTURER: The National Cash Register Company, Dayton, Ohio 45409. Telephone (513) 449-2000.

MODELS: NCR Century 50, 100, 101, 200, and 300 Computer Systems.

DATA FORMATS

BASIC UNIT: 8-bit byte. Each byte can represent 1 alphanumeric character, 1 or 2 BCD digits (in unpacked or packed format, respectively), or 8 binary bits. (Four consecutive bytes form a "word" in the Century 300 system only.)

FIXED-POINT OPERANDS: Can range from 1 to 256 bytes in length, in either decimal or binary mode. (On the Century 300, a "word binary" mode is available that takes particular advantage of the Century 300's 4-byte adder; each 4-byte word is treated as a signed 31-bit integer.)

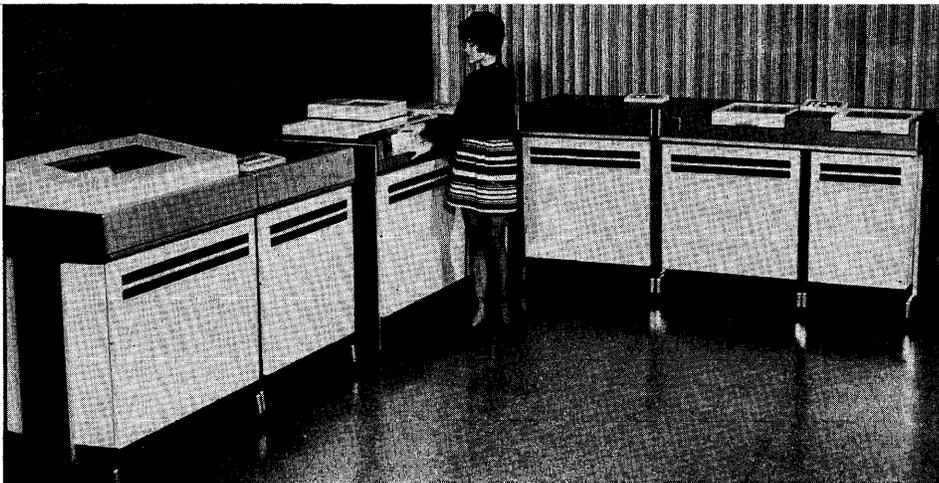
FLOATING-POINT OPERANDS: Consist of a 7-bit hexadecimal exponent and a 24-bit or 56-bit fraction (in "short" or "long" format, respectively).

INSTRUCTIONS: 4 or 8 bytes in length, specifying 1 or 2 memory addresses, respectively.

INTERNAL CODE: ASCII.

MAIN STORAGE

STORAGE TYPE: Thin-film, short-rod up through the 48K-byte Century 200 System, except for the Century 101. Each plated copper rod stores 1 bit and is 0.006 inches in diameter and 0.110 inch long. Conventional magnetic core storage is used for the Century 101, expanded Century 200 systems (64K bytes or larger), and all Century 300's. >



This Century 101 Basic System consists of a 16K central processor, 450-lpm printer, 300-cpm card reader, and dual-spindle disc unit capable of storing up to 8.4 million bytes. Newest of the five Century Series processors, the Century 101 offers more than twice the internal performance of the Century 100 at less than a 50% increase in cost.

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▷ embodies some striking technical features for an entry system in its class. Thus, the range of Century processing capability was established by the end of 1970, and has not since been extended. But significant additional activity has taken place within the Century Series, including release of an additional, intermediate processor—the Century 101; dramatic developments in peripheral availability—the NCR-CDC joint venture; and further development of an already extensive line of commercially oriented application software—more than 30 major systems, many of which include multiple, separately usable program subsystems.

A recent flurry of activity in the Century Series since the April 1972 release of the 101 has included: purchase price reductions on the basic Century 50 and 100; availability of three new intermediate memory sizes for the Century 200; doubling of the maximum Century 300 memory capacity to 4 million bytes; addition of 4 new instructions for the Century 300, reduction in the cycle time of the Century 300 time-of-day clock; and considerable relaxation of configuration rules for the Century 50, permitting still more peripheral devices to be used in the system.

NCR's announced marketing goal to sell 5000 Century Series machines within five years after introduction of the Series will be approached but not fully achieved. World-wide installations of the Century Series have exceeded 3000 systems to date, with several hundred more on order. The shortfall is due at least as much to a lengthy and troubling strike at NCR during 1971 and to the poor general economic conditions over the past several years as to competitive pressures.

NCR design engineers set a bold course in the Century Series with a number of significant technical innovations. Primary among these was the use of a thin-film, short-rod main memory. Prior to NCR's adoption of this memory technology, its use had been limited to state-of-the-art military and advanced engineering systems. (A thin-film, long-rod technology was employed earlier in the NCR 315/RMC systems). The use of thin-film, short-rod memory and monolithic integrated circuitry permitted the various Century models (except for the Century 300, which has used only conventional magnetic core main memory) to have a "low-boy", table-top look that made them significantly different in appearance from that of most competitive data processing systems. Furthermore, significant savings in development cost were possible with the thin-film technology, thus permitting more "bang per buck" in other aspects of the system design.

A number of problems, however, were reported among some of the earlier installations of the thin-film, short-rod memory systems. NCR responded positively to the resulting market pressure by providing optional magnetic core memory on the Century 200, and by releasing the Century 300 with magnetic core memory only. Recently, the ▷

▶ **CAPACITY:** See table. Specific memory sizes available for each processor are summarized below.

Century 50 or 100: 16,384 or 32,768 bytes.

Century 101: 16,384; 24,576; 32,768; 49,152; or 65,536 bytes.

Century 200: 32,768; 49,152; 65,536; 98,304; 131,072; 196,608; 262,144; 393,516; or 524,288 bytes.

Century 300: 131,072 to 4,194,304 bytes. A Century 300 system can include from 1 to 8 Memory Storage Units (MSU's) containing 131,072, 262,144, 393,216, or 524,288 bytes each. Each MSU consists of four equal-sized memory modules that cycle independently of each other.

CYCLE TIME: See table. In the Century 300, word addresses are interleaved among the four memory modules within each MSU to permit overlapped accessing. Also, the Century 300 can access one, two, or three bytes during each cycle instead of the standard four bytes.

CHECKING: Parity bit with each byte is generated during writing and checked during reading.

STORAGE PROTECTION: None in the Century 50, 100, or 101. Provided by the optional Multiprogramming feature for the Century 200. In the Century 300, storage protection is provided by multiple base address and limit address registers. For each active Century 300 program, one base address register (BAR) and one limit address register (LAR) define the lower and upper address limits of main storage that can be accessed.

RESERVED STORAGE: In the Century 50 through 200 Processors, byte locations 0 through 1279 are reserved for registers, control words, and the resident executive. In the Century 300, byte locations 0 through 2447 are reserved for these purposes.

CENTRAL PROCESSORS

INDEX REGISTERS: The Century 50 through 200 provide 63 index registers, located in main storage. In the Century 300, a separate set of 63 registers is maintained in reserved storage for each active program.

INDIRECT ADDRESSING: None in Century 50 or 100; up to 5 levels in the Century 101, 200, and 300 that can be combined with indexing.

INSTRUCTION REPERTOIRE: The Century 50 and 100 each have 19 instructions: decimal add and subtract, binary add and subtract, move, compare, pack, unpack, repeat, wait, input/output, and 8 different branch instructions. Arithmetic can be performed only in unpacked decimal and binary modes, upon unsigned fields up to 256 bytes in length. Standard subroutines are used for multiplication and division.

The Century 101 has 34 standard instructions, including all of the Century 50 or 100 instructions plus optional instructions for multiply and divide and a Command feature for logical bit manipulation.

The Century 200 has 39 standard instructions, including all of the Century 50 or 100 instructions plus facilities for packed, signed decimal addition and subtraction, editing, code translation, scanning, and bit and character testing. Up to 27 more instructions can be added by the Century 200 Optional Features listed below:

Multiply feature: provides fixed-point multiplication of packed decimal fields.

Command feature: provides logic and table compare instructions. ▶

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CHARACTERISTICS OF THE CENTURY SERIES SYSTEMS

	Century 50	Century 100	Century 101	Century 200	Century 300
SYSTEM CHARACTERISTICS					
Maximum no. of processors supported by standard software	1	1	1	1	1
Operating systems	B1, B2	B1, B2	B1, B2	B1, B2, B3	B1, B3, B4
Typical system rental	\$1,800	\$2,600	\$3,600	\$5,500	\$19,000
Date of first delivery					
MAIN STORAGE					
Cycle time, microseconds	0.8	0.8	1.2	0.8 or 0.65*	0.65
Bytes accessed per cycle	1	1	2	2	4
Minimum capacity, bytes	16K	16K	16K	32K	128K
Maximum capacity, bytes	32K	32K	64K	512K	4096K
Storage increment size, bytes	16K	16K	8K or 16K	16K or 32K	128K
Main storage type	Thin-film, short-rod	Thin-film, short-rod	Magnetic core	Thin-film, short-rod*	Magnetic core
Interleaving	None	None	None	None	4-way
Storage protection	None	None	None	Optional	Standard
Reserved storage, bytes	1280	1280	1280	1280	2448
CENTRAL PROCESSOR					
No. of hardware instructions	19	19	37	66	71
Index registers	63	63	63	63	63 for each active program
Maximum no. of interrupts	2	2	9	8	16
Floating-point hardware	None	None	None	Optional	Standard
Decimal instructions	2	2	5 (+2 opt.)	5 (+1 opt.)	9
Divide hardware	None	None	Optional	None	Standard
Indirect addressing	None	None	5 levels	5 levels	5 levels
IBM 1400 Series compatibility	None	None	None	Optional	None
NCR 315 compatibility	None	None	None	Optional	None
INSTRUCTION TIMES (fixed-point decimal, in microseconds):					
Add, unsigned, unpacked (5 digits)	59	59	28.8	18 (or 15)*	9
Add, signed, packed (5 digits)	**	**	25.2	14 (or 11)*	7.2
Multiply, unsigned, unpacked (5 digits)	**	**	**	**	20
Multiply, signed, packed (5 digits)	**	**	127.2	129 (or 105)*	18.5
Divide, unsigned, unpacked (5 digits)	**	**	**	**	15.3
Divide, signed, packed (5 digits)	**	**	134.4	**	12.9
I/O CONTROL					
Total number of trunks	2	2	4	8	11
Maximum aggregate I/O data rate, bytes/sec	148KB	148KB	416KB	900KB	4,300KB
Common trunk transmission rates, bytes/sec:					
Standard trunks	108KB***	108KB 40KB	416KB 120KB	2 x 130KB 77KB*** 1KB***	6 x 850KB 210KB***
Optional additional trunks	40KB	None	277KB 166KB	2 x 420KB 2 x 130KB	4 x 1,100KB

* 0.8-microsecond thin-film memory is used in 32K and 48K Century 200 systems; larger Century 200's use 0.65-microsecond core memory, resulting in faster instruction times.

** Handled by subroutine; timings not available.

*** Integrated trunk. On the Century 300, the 8-position integrated multiplexor can accommodate a data transfer rate up to 190KB on any one position, subject to an overall multiplexor data rate of 210KB.

➤ Century 200 configuration rules have been revised, retaining thin-film memory on the "basic" system with less than 64K bytes, but providing magnetic core memory for all expanded Century 200 systems. This high-performance magnetic core memory, with a cycle time of 650 nanoseconds per 2-byte access, is 23 percent faster, considerably more compact, and only 5 to 15 percent more ➤

➤ **Floating Point feature:** provides 12 instructions for floating-point arithmetic in "short" (4-byte) and "long" (8-byte) formats.

Multiprogramming feature: provides base and limit address registers, interval timer, and other hardware facilities to make multiprogrammed operation practical.

Trace (Console Debug) feature: provides 2 special instructions to facilitate program debugging. ➤

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▷ expensive (depending upon capacity) than the basic Century 200 short-rod memory. The newly announced Century 101 uses core memory only.

High production costs for certain Century Series peripheral devices have been a chronic problem at NCR. This factor, combined with a long-standing and mutually satisfactory original equipment manufacturer's (OEM) arrangement between NCR and Control Data Corporation, was primarily responsible for the formation of an equally-owned joint venture between NCR and CDC. Under an agreement announced in principle in January 1972, a jointly owned subsidiary called Computer Peripherals, Inc. was set up to produce magnetic tape equipment, printers, and punched card equipment. CDC is also now NCR's supplier of disc drives for the Century Series. These arrangements should result in the continuing availability of top-quality peripheral equipment for the Century Series at substantially reduced manufacturing costs for NCR.

Compatibility between the Century computers and other currently popular systems is limited. IBM-compatible tape units and an 8-bit byte data format are used, but the internal code is ASCII rather than EBCDIC, and System/360 and 370 compatibility has also been ignored in both the processor instruction repertoire and the removable disc packs. Optional compatibility features enable a Century 200 to execute machine-language programs written for the second-generation NCR 315 or IBM 1401, 1440, or 1460 computers.

NCR has maintained full upward compatibility within the Century Series. The Century 50 and 100 Processors have a "stripped-down" repertoire of just 19 instructions. The Century 101, about 2.5 times as fast as the 100, has 34 standard instructions plus 3 optional instructions. This repertoire is essentially that of the Century 200 except for the 200's NCR 315 and IBM 1400 series emulation instructions. The Century 200, which is about 5 times as fast internally as the 100, has 39 standard instructions, with up to 27 more instructions available through various optional features.

The Century 300, about 5 times as fast internally as the Century 200, has 71 standard instructions, including all those available in the Century 200 except instructions associated with the Century 200's optional NCR 315 and IBM 1400 series compatibility. Even the input/output commands have been left unchanged, so that it is possible to run object programs written for smaller Century Series processors on a Century 300 without recompilation. Thus, except for NCR 315 and IBM 1400 series emulation, which is available only for the Century 200, NCR stresses that all hardware differences between the five processors are resolved by the standard software, so that users can easily move up from the small-scale Century 50 to the large-scale 300 without reprogramming. ▷

▶ **NCR 315 Compatibility feature:** provides 3 additional instructions and a separate Emulation Unit, enabling a Century 200 to execute programs written for NCR 315 computers.

IBM 1401 Compability feature: provides special instructions that facilitate software simulation of IBM 1401, 1440, or 1460 computers. Internal speed of the Century 200 in Compatibility mode is about 1.5 times that of the original 1401.

The Century 300 has 71 instructions, all standard, including all of the Century 200 instructions except those associated with the optional NCR 315 and IBM 1401 Compatibility features. There are 7 classes of Century 300 instructions:

Decimal Arithmetic: 9 instructions for adding, subtracting, multiplying, dividing, and comparing signed, packed BCD fields; for adding and subtracting unsigned, unpacked BCD fields; and for packing and unpacking BCD fields.

Fixed-Point Binary: 10 instructions for adding, subtracting, multiplying, dividing, and shifting word-oriented (4-byte) binary operands; for adding, subtracting, and comparing variable-length binary fields; and for performing binary-to-decimal and decimal-to-binary conversions.

Floating-Point: 12 instructions for adding, subtracting, multiplying, dividing, and comparing floating-point operands in both short (1-word) and long (2-word) formats.

Data Movement: 3 instructions for internal data transfer operations.

Logical: 8 instructions for editing, scanning, code translation, and Boolean operations.

Transfer: 13 instructions for testing, branching, and counting.

Special: 16 instructions for various hardware functions such as input/output, loading base and limit address registers, repeating an instruction, setting up trace/monitor conditions, handling interrupts, etc.

INSTRUCTION EXECUTION TIMES: See table.

INTERRUPTS: See table.

TIME-OF-DAY CLOCK: In the Century 300 only, an optional clock register, located in main memory, provides a binary indication of the time of day for use in controlling real-time programs, schedulers, and job accounting routines. The clock is incremented every millisecond.

INPUT/OUTPUT CONTROL

I/O CHANNELS: See table. Basic Century channels can accommodate 8 I/O positions each. On the Century 300, six High-Speed Trunks, with 4 positions each for free-standing peripherals and/or controllers, and one 8-position Multiplexor Trunk are standard. Three of the Century 300 multiplexor positions are reserved for the interval timer, I/O writer, and CRT display system; the other five positions can be used for free-standing peripherals and/or controllers. Four optional 8-position "Very High-Speed Trunks" are also available for the Century 300.

SIMULTANEOUS I/O OPERATIONS: A maximum of 1 I/O operations can occur concurrently with computing in the Century 50 or Century 100, and 4 or 8 in the Century 200 (i.e., 1 operation per I/O channel). The Century 101 can perform up to 9 I/O operations on 4 trunks simultaneously with computing due to a greater system bandwidth and the Multiplexor Channel. ▶

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➤ All software for the Century computers is disc-oriented and highly integrated. The principal software facilities include four levels of operating systems, compilers for the COBOL and FORTRAN languages, an assembler for NCR's own NEAT/3 language, and an impressive assortment of utility routines and business-oriented application programs. COBOL and FORTRAN compilers are each offered at three different levels, tailored for operation on different equipment configurations. Also provided is a conversational-mode compiler for the BASIC language, available for the Century 50 or 100 with an optional hardware support package, or for the Century 200.

Program language translators to convert source-level code are available to ease the conversion task to the Century 300 for installations that are currently using NCR 315/RMC or IBM System/360 or 370 computers.

NEAT/3 is essentially a symbolic assembly language, but it places an unusually strong emphasis upon the use of macro-instructions to facilitate coding. NCR is encouraging Century users who are first-time computer users to program exclusively in the "Level 1" version of NEAT/3. At this level, all coding consists of macro-instructions and pre-coded "Major Functions." Thus, the programmer does not need to concern himself with machine instructions or other hardware details. For more advanced programmers, higher-level versions of NEAT/3 permit full utilization of all the Century hardware facilities.

Elementary NEAT is a version of the NEAT/3 language that has been developed specifically for the Century 50. It offers an easy-to-learn subset of the more commonly used NEAT/3 language elements, together with higher compilation speeds. NCR states that most Century 50 users select Elementary NEAT as their principal programming language.

Customer support for the Century Series computers is focused on several Regional Systems Centers. These facilities are staffed by specialists in the major fields serviced by NCR. The centers also provide training courses for customer personnel and computers on which customers can compile and test their programs before their own systems are delivered.

NCR's pricing structure can best be described as containing a "basic bundle." Under the plan which NCR announced in September 1969, NCR supplies certain essential and predetermined systems support and educational assistance along with the hardware. Once the basic allotments have been exceeded, any additional NCR support services that may be needed are separately priced. Most software is supplied without extra charge.

NCR's pricing policy represents a reasonable "middle road" between the overall package pricing that has been traditional for the computer industry and the complete ➤

➤ On the Century 300, one I/O operation can occur on each of the 6 High-Speed Trunks, on each of the 8 subchannels of the Multiplexor Trunk, and on each of the 4 Very High-Speed Trunks (if installed) concurrently with computing, resulting in 18-way I/O simultaneity. Also, the Input/Output Control Unit and the Instruction Look-Ahead and Execution Units of the Century 300 Processor can all access main storage simultaneously.

I/O DATA RATES: See table.

I/O INTERFERENCE: Due to the "cycle-stealing" technique used in the Century Series, the Century 50 or 100 processor is delayed for an average of 4.8 microseconds for every byte transferred to or from main storage. The Century 101 has an I/O interference of 2.4 to 6.0 microseconds per byte, depending upon the data rate of the I/O channel, while the Century 200 is delayed 3.2 or 0.8 microseconds per byte for I/O operations on the Standard or High-Speed channels, respectively.

On the Century 300, due largely to the 4-way memory interleaving, the maximum system I/O data rate of 4.3 million bytes/second can be maintained with a central processor I/O degradation of 0 to 150 nanoseconds.

MASS STORAGE

655 SERIES DUAL-SPINDLE DISC UNITS: One of NCR's unique 655 series disc units is included in each Century 50 through 200 Basic System, and a second unit can be added to a Century 50 or 100 without adding a separate controller. Each unit has two independent spindles, and each spindle is capable of driving a removable disc pack. The 3-disc NCR 955-1 disc pack stores up to 4,194,304 bytes (or 8,388,608 packed decimal digits) in 512-byte sectors, with 8 sectors per track. Each spindle has a comb-like access mechanism with 12 read/write heads servicing each of the 6 recording surfaces. Up to 262,144 bytes per pack can be read without head movement (524,288 bytes per dual-spindle unit).

Types 655-151 (basic unit for Century 50 only) and 655-152 (optional second unit for Century 50 only) have an average head movement time of 131 milliseconds, while Types 655-101 (basic unit for Century 100 only) and 655-102 (second unit for Century 50 or 100) have an average head movement time of 44.7 milliseconds. All four dual-spindle models have an average rotational delay of 20.8 milliseconds and a data transfer rate of 108,000 bytes/second. All four models are for "integrated" attachment to the Century 50 or 100, respectively, and do not require controllers.

The 655-201 Dual-Spindle Disc Unit is similar to the 655-101 or 655-102 except that it is a "free-standing" unit that is used with the 625-101 Disc Controller. Up to four 655-201 units (or up to eight spindles) can be attached to each controller. The same 955-1 disc pack is used with the 655-201 unit. The 655-201 is part of the Century 101 and 200 Basic Systems.

657-101/102 DISC SUBSYSTEM: Provides large-capacity random-access storage in removable 11-high disc packs. Each NCR 957-1 disc pack stores up to 29.8 million bytes of data in standard-density format or up to 47.7 million bytes in "double-density" format. The 957-1 pack is physically compatible with the IBM 2316 pack, although the recording formats differ. Each spindle holds one disc pack and has a comb-like access mechanism with one read/write head serving each of the 20 recording surfaces. Average head movement time is 60 milliseconds and average rotational delay is 12.5 milliseconds. Capacity and data transfer rate depend upon which of two controllers is used:

- The 625-201 Disc Controller records data at a density of 2200 bpi. Maximum data capacity is 7459 bytes per track, 149,180 bytes per cylinder, and 29.8 million bytes per 11-disc pack. Data transfer rate is 315,000 ➤

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▷ separation of hardware and software prices. The NCR approach recognizes each computer manufacturer's fundamental obligation to provide its customers with the basic tools necessary to implement their systems. At the same time, it makes additional software, support, and education conveniently available to users who need this further assistance and are willing to pay for it, without penalizing those who do not.

The Century 50

NCR Century 50 rental prices range from \$1,575 to as much as \$4,000 or more, depending upon the configuration. Though the Century 50 offers little that is new in the way of hardware or software technology, it does embody most of the technological innovations that have distinguished the Century Series since its introduction.

Monolithic integrated circuits are used extensively, and NCR's distinctive thin-film, short-rod memory provides a fast cycle time of 800 nanoseconds per one-byte access. Every Century 50 system includes at least one dual-spindle disc unit, with 12 read/write heads serving each of the 6 recording surfaces on each removable 3-disc pack. Moreover, all of the Century Series software is disc-oriented, and even the smallest Century 50 system can utilize an integrated operating system and COBOL and FORTRAN compilers.

The Century 50 Processor has the same data formats, instruction repertoire, memory cycle time, and instruction execution times as the Century 100 Processor. To get the price down, NCR has reduced the speeds of the basic printer and disc unit and has somewhat restricted the possibilities for connecting additional peripheral equipment. Like the Century 100, the Century 50 processor has a limited repertoire of just 19 instructions. Addition and subtraction can be performed only in binary or unpacked decimal mode, upon unsigned fields ranging from 1 to 256 bytes in length. Since few users will program the Century 50 at the machine-instruction level, the limited instruction set is not likely to cause programming difficulties. However, the Century 50 must use subroutines to perform multiplication, division, editing, code translation, and other operations that can be accomplished by single machine instructions in many larger computers.

The Century 50 Basic System consists of a central processor with 16,384 bytes of rod memory, a dual-spindle disc drive with a 153-millisecond average access time and an on-line storage capacity of 8.4 million bytes, a 200-lpm printer, and either a 300-cpm card reader or a 1000-cps punched tape reader. This basic configuration rents for \$1,575 per month, including maintenance, or sells for \$88,000. (Incidentally, that purchase-to-rental ratio of 55.5 to 1 is one of the highest we've seen.)

A buyer stands to save \$925 per month, or \$17,000 on the purchase price, by choosing a Century 50 Basic ▷

► bytes/second. Available for the Century 200 with High Speed Trunk or the Century 300, the 625-201 can control up to eight 657-type spindles for a total on-line capacity of 238.4 million bytes.

- The 625-202 Dual-Density Disc Controller can record data at either 2200 or 3500 bpi, under programmed control. Maximum data capacity at the higher density is 11,944 bytes per track, 238,880 bytes per cylinder, and 47.7 million bytes per pack. Data transfer rate is 500,000 bytes/second. Available for the Century 300 only, the 625-206 can control up to eight 657-type spindles for a total on-line capacity of 381.6 million bytes.

The 657-type disc drives are available in either one-spindle units (Model 657-101) or two-spindle units (Model 657-102). The one-spindle model can be converted to a dual-spindle unit with a 6571 Add-on Drawer.

653-101 CRAM (CARD RANDOM ACCESS MEMORY): Provides relatively low-cost random-access storage for large data files. Each unit stores 113 million bytes of data in a removable cartridge containing 384 oxide-coated Mylar cards. Each card has 144 tracks, and each track can hold 2623 bytes of data. A 36-head access mechanism moves to one of four positions to serve all the tracks. Card drop time is 90 to 125 milliseconds, head movement time is approximately 25 milliseconds, average rotational delay is 24 milliseconds, and data transfer rate is 83,000 bytes/second. The overall average access time is 125 milliseconds per card. Up to eight CRAM units can be connected to a 623-201 CRAM Controller.

INPUT/OUTPUT UNITS

MAGNETIC TAPE HANDLERS: Six models of CDC-built 633 Series tape units are offered. Data transfer rates range from 10,000 to 240,000 bytes/sec. All use standard 1/2-inch tape, have vacuum-capstan drives, and use photo-cell sensing. Up to 8 tape units can be connected to a 624-type control unit. The following models are available:

633-111: 9 tracks; phase-encoded; 1600 bytes/inch; 80,000 bytes/sec. Forward tape speed 50 ips, rewind speed 150 ips. Requires 624-111 Controller.

633-117: 7 tracks; NRZI; 200, 556, or 800 char/inch; 10,000, 27,800, or 40,000 char/sec. Forward tape speed 50 ips; rewind speed 150 ips. Requires 624-179 Controller.

633-119: 9 tracks; NRZI; 800 bytes/inch; 40,000 char/sec. Forward tape speed 50 ips; rewind speed 150 ips. Requires 624-119 or 624-179 Controller.

633-121: Dual-drive unit with same characteristics as 633-111.

633-211: 9 tracks; phase-encoded; 1600 bytes/inch; 144,000 bytes/sec. Forward tape speed 90 ips; rewind speed 240 ips. Requires 624-211 Controller. Not usable with Century 100.

633-311: 9 tracks; phase-encoded; 1600 bytes/inch; 240,000 bytes/sec. Forward tape speed 150 ips; rewind speed 380 ips. Requires 624-311 Controller. Not usable with Century 100.

680-201 CARD READER: Reads 80-column cards serially at 1200 cards per minute. Has one input hopper and one output stacker with capacities of 4,000 cards each. A reject stacker with a capacity of 240 cards is also provided. Does not require a controller.

682-100 INTEGRATED CARD READER: Integral part of the Century 50 through 200 Basic Systems. Reads standard 80-column cards at a peak rate of 300 cards per minute. Cards are read in serial, column-by-column fashion by 12 photo-electric cells. Cards punched in Hollerith code (Extended A or H set) are translated into the internal (ASCII) ►

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▷ System instead of its Century 100 counterpart. In return, he'll have to accept a 250-lpm reduction in rated printing speed and an 88-millisecond increase in average disc access time.

When originally announced, the Century 50 was bound by strict configuration rules. Since that time, the rules have been eased considerably. All types of NCR peripherals—MICR, OCR, magnetic tape, punched card, paper tape, and data communications—can now be connected to the Century 50 in addition to the standard devices in the Basic System. Currently, only the non-availability of the highest-speed, highest-performance Century 100 peripherals distinguishes a Century 50 from a Century 100.

The Century 50 has plainly been designed and priced to compete effectively against the popular IBM System/3. Since every Century 50 system includes disc storage and costs at least \$1,575 per month, the Century 50 is not directly competitive with card-oriented System/3 Model 10 configurations nor with the newer, keyboard-oriented System/3 Model 6. Instead, NCR stresses the many advantages of batch-mode "magnetic file processing" with disc-based master files, bringing the Century 50 into head-to-head competition with disc-oriented System/3 Model 10 systems.

The lowest-priced System/3 Model 10 disc configuration that is supported by IBM software rents for just \$1,559 per month—\$16 less than the Century 50 Basic System—but has only 12K bytes of main storage and a single 2.46-million-byte disc drive. A System/3 configuration that is more directly comparable with the Century 50 Basic System would include a 16K processor, a 200-lpm printer with 132 print positions, a multi-function card unit with a 250-cpm reading speed and 60-cpm punching speed, and two disc drives with a total storage capacity of 7.37 million bytes. This System/3 configuration rents for \$2,234 per month (or \$659 more than the basic Century 50) and sells for \$79,450 (or \$2,980 more than the basic Century 50).

Among the significant differences between the Century 50 and the IBM System/3 Model 10 are the following:

- The Century 50 offers full program compatibility with larger computers, while the System/3 does not.
- The Century 50 can have a maximum of 16.8 million bytes of on-line disc storage, compared with up to 40.96 million bytes for the System/3.
- All of the current Century 50 software is supplied at no extra charge, whereas most of the System/3 software is separately priced.
- NCR offers a \$1,500 training allowance, compared with none for the System/3.

▶ code by a combination of hardware and software techniques. Has a 1000-card input hopper and a single 1000-card output stacker. Does not require a controller. The 682-100 is not available for the Century 300.

686-102 CARD READ/PUNCH: Single card feed path. Reads 80-column cards serially at up to 800 cpm and punches column-by-column at 83 to 294 cpm, depending on the number of columns punched. Has a 1500-card input hopper, and two 1800-card programmable output stackers plus a 100-card reject stacker. Does not require a controller.

686-111 CARD READ/PUNCH: Reads 80-column cards serially at up to 560 cpm and punches column-by-column at 60 to 180 cpm, depending on the number of columns punched. Has a 1500-card input hopper and two 1800-card programmable output stackers plus a 100-card reject stacker. Does not require a controller. Available for the Century 50 as well as for the larger models.

686-201 CARD READER: Reads 80-column cards serially at up to 750 cpm. Has a 1500-card input hopper and two 1800-card programmable output stackers plus a 100-card reject stacker. Does not require a controller. Available for the Century 50.

686-302 CARD PUNCH: Punches 80-column cards at 83 to 294 cpm, depending on the number of columns punched. Does not require a controller.

686-311 CARD PUNCH: Punches 80-column cards at 60 to 180 cpm, depending on the number of columns punched. Does not require a controller. Available for the Century 50.

687-301 CARD PUNCH: Punches 80-column cards at 100 cpm. Has an 800-card input hopper and an 800-card output stacker. Requires a 622-701 controller.

662-100 INTEGRATED PUNCHED TAPE READER: Available as an integral part of the Century 50 through 200 Basic Systems; may be selected as an alternative to the 682-100 Card Reader. Reads 5-, 7-, or 8-channel punched tape at a peak rate of 1000 characters (100 inches) per second. Can read strips or rolls varying from 1 to 350 feet in length. Standard code is ASCII with even parity, but any user-defined code with either odd or even parity can be read. Does not require a controller. Not available with the Century 300.

660-101 PUNCHED TAPE READER: Reads 5-, 7-, or 8-channel tape at 1500 char/min. Uses photoelectric read cells with either continuous or start/stop operation with a rewind rate of 150 inches/sec. Does not require a controller. Available for the Century 50.

665-101 TAPE PUNCH: Punches 5-, 7-, or 8-channel tape at 200 char/min. Operates in either continuous or start/stop mode.

626-101 PRINTER CONTROLLER: Connects any of the following free-standing printers to Century 100, 200 or 300 computer systems only, through a common trunk attachment: 640-102, -200, -205, -210, -215, or -300. The 626-101 Controller is also used to attach the 640-102 or 642-300 Printer to the Century 101 as a free-standing unit.

640-102 INTEGRATED PRINTER: Integral part of the Century 100 and 101 Basic Systems. Can also be connected to a Century 50 or 200. Has 132 print positions and 64 printable characters. Peak speed is 450 lpm with 64-character set. Optional 52-character set enables all-numeric printing at 900 lpm. Print spacing of 6 or 8 lines per inch is available. The 640-102 is not available with the Century 300. It requires a 626-101 Controller for attachment to a Century 200 or 300, or for use as an additional, free-standing unit with a Century 100 or 101.

640-122 PRINTER: Standard printer in the Century 50 Basic System. Prints up to 200 alphanumeric lines per ▶

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➤ On balance, the Century 50 shapes up as an appropriate choice for many companies that are installing their first computers or upgrading from punched cards to disc systems. By providing effective disc-oriented business data processing capabilities at a very reasonable price, the Century 50 neatly fills the gap that previously existed between NCR's electronic accounting machines and the larger Century Series computers.

The Century 100, 101, and 200

The basic Century 100 system consists of a central processor with 16,384 bytes of rod memory, two I/O channels, one dual-spindle disc drive, a 450-lpm printer, and either a 300-cpm card reader or 1000-cps paper tape reader. The processor contains built-in controllers for the three standard peripheral units. The memory capacity can be increased to 32,768 bytes, and a wide range of peripheral equipment can be connected.

The basic Century 101 system consists of a processor with 16,384 bytes of core memory, two I/O channels—one of which is a five-position multiplexor channel, one dual-spindle disk drive, a 450-lpm printer, and either a 300-cpm card reader or a 1000-cps paper tape reader. The memory capacity can be expanded to 64K bytes, two more I/O trunks can be added, and a wide range of peripheral equipment can be connected.

The basic Century 200 system consists of a processor with 32,768 bytes of rod memory, four I/O channels, a console typewriter, one dual-spindle disc drive, a 1500-lpm drum printer, and either a 300-cpm card reader or 1000-cps paper tape reader. A Century 200 can be expanded by adding up to 524,288 bytes of memory, four more I/O channels, numerous peripheral units, and several worthwhile optional features. For expanded Century 200's (64K bytes or larger), all main memory is of the magnetic core tape.

The Century 300

The NCR Century 300 provides impressive hardware and software facilities for multiprogrammed batch processing of business and scientific applications. It is also an effective performer in real-time and data communications environments.

Thus, the Century 300 shapes up not only as the logical choice for current users of the NCR 315/RMC or Century 200 computers who need more processing power, but also as a system that merits careful consideration by most companies shopping for a new medium-scale computer.

Monthly rentals for Century 300 systems begin at about \$15,000, with most systems falling into the \$20,000 to \$25,000 range. The "Basic" Century 300 package, unlike ➤

➤ minute. Has 132 print positions and 64 printable characters. Print spacing is 6 or 8 lines per inch. Available for the Century 50 only. Does not require a controller.

640-132 PRINTER: Can be selected as a higher-speed substitute for the basic 640-122 Printer on the Century 50 only. Has 132 positions and a standard set of 64 printable characters. Prints up to 300 alphanumeric lines per minute. Optional 51-character set with double numerics permits all-numeric printing at 600 lpm. Print spacing of 6 or 8 lines per inch is available. Does not require a controller.

640-200 PRINTER: Usable as integrated printer in the basic Century 200 system. Can also be connected to any Century 100, 200, or 300 as a free-standing unit via the 626-101 Controller. Has 132 print positions and 64 printable characters, with 160 print positions and a 52-character print set optionally available. Peak speed is 1500 lpm. Optional 52-character set enables all-numeric printing at 3000 lpm. Continuous Form Tab Set Handling is available. Not usable with the Century 50 or 101.

640-205 OCR PRINTER: Basically a 640-200 Printer plus OCR print fonts, the 640-205 is interchangeable with the 640-200. The 640-205 handles OCR-A and OCR-B character sets, as well as all standard type lines available for the 640-200. In OCR printing mode, the 640-205 prints at 1500 lpm for numerics only and at 750 lpm for numerics and separators. For non-OCR printing, the 640-205 prints at either 1500 or 3000 lpm, depending upon the character set and OCR type used.

640-210 PRINTER: Same as the 640-200, except has 160 print positions.

640-215 OCR PRINTER: Same as the 640-205, except has 160 print positions.

640-300 PRINTER: Usable in the same manner as the 640-200, including installation as the integral printer in the Century 101 system. Has 132 print positions and up to 128 printable characters (double alpha). Peak speed is 1200 lpm with 64-character set. Requires the 626-101 Controller for attachment to a Common Trunk.

6101 I/O WRITER: Standard in the Century 200 system and optional in the Century 50, 100, and 101, this I/O unit facilitates operator/computer communication by providing keyboard input and typed hard-copy output at a rated speed of 6 characters per second. It consists of an ASCII keyboard and a typing unit with pin-feed platen.

420-1/420-2 OPTICAL CHARACTER READERS: Both models read journal tapes imprinted with NCR Optical Font (NOF) characters at 52 lines per second. From 1 to 32 characters can be read from each line, and the units recognize 10 stylized numeric digits and 6 special symbols. Differences between the 420-1 and 420-2 include the following:

	420-1	420-2
Journal roll length	100 feet (max.)	130 feet (max.)
Transport speed	6.5 ips	13 ips
Read speed	26 lines/sec (max.)	52 lines/sec (max.)
	832 cps	1664 cps
Rescan time	160 msec/line	40 msec/line
Manual entry required	entire line	unreadable characters

The 420 readers are connected to the common trunk through the 622-301 OCR Control Unit.

670-101 MICR SORTER/READER: Reads MICR-encoded documents of intermixed sizes, thicknesses, and paper weights at up to 600 documents per minute. Has 11 pockets capable of holding up to 225 items each. Also ➤

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➤ other basic Century systems, is not a complete configuration; it consists of the processor and main memory only. Among the major improvements offered by the Century 300 over the smaller NCR Century computers are the following:

- From 131K to 4096K bytes of core storage with a 650-nanosecond cycle time per 4-byte access.
- Four independently cycling core memory modules with 4-way interleaved addressing.
- Overlapped operation of two independent functional units—an Instruction Look-Ahead Unit and an Execution Unit—within the central processor.
- An Input/Output Control Unit capable of handling 18-way I/O simultaneity and a total data rate of up to 4.3 million bytes per second.
- A 16-level priority interrupt system.
- A standard Operator Communication Center that includes a CRT display, printer, keyboard, and control panel.

The Century 300 Processor uses monolithic integrated circuits of the same basic type used in the smaller Century systems. "Hard-wired" logic is used in preference to the more flexible (but often slower) microprogramming control techniques employed in many other contemporary computers. The NCR 315 and IBM 1400 series emulators which are optional features for the Century 200 Processor are not available for the Century 300.

The Century 300 can use all of the peripheral equipment available for the Century 100 or larger, plus a number of other high-speed devices. The flexibility of the Century 300 hardware is somewhat limited, however, by the fact that no dual-channel peripheral controllers and no facilities for effective multiprocessing have been announced to date.

Though the Century 300 blazes no new trails in either hardware or software technology, it shapes up as a well-designed, state-of-the-art system. Perhaps because of the dramatic increase in processing power that the Century 300 offers over the next lower model—about five times the internal speed of the Century 200—and the associated substantially higher price, few Century 200 users have been attracted to the system; no more than half a dozen Century 300 systems have been installed to date.

In summary, the NCR Century Series shapes up as a mature third-generation system whose five upward-compatible models encompass a wide range of computational capability. First-time computer users should give the Century Series a serious look, as can current users of second-generation systems such as the IBM 1400 series and "low-end" users of other third-generation systems. □

➤ usable for off-line sorting. Consists of a 622-401 Controller and a 404-111 Sorter. Available for the Century 50 as well as for the larger models.

671-101 MICR SORTER/READER: Reads MICR-encoded documents at up to 1200 per minute. Has 18 pockets. An endorser feature is available as an option. Also usable for off-line sorting. Not available for the Century 50 or 100. Includes a controller.

735 & 736 DATA RECORDERS: These keyboard-to-tape recorders, manufactured by Mohawk Data Sciences, can be connected on-line with the 622-201 Controller or 621-101 Controller with associated adapter to provide low-speed magnetic tape input (at up to 1500 char/sec) and output (at up to 700 char/sec). Available for the Century 50 as well as for the larger models.

798-100 VOICE RESPONSE: Requires a 621-101, -102, or -103 Communications Multiplexor with associated adapters. A "voice film" is used to store the 31-word vocabulary on a continuously rotating drum. Each word is contained on a separate track with its own photoelectric read cell. The drum revolves once every 625 milliseconds. Up to 56 Touch-Tone telephones can be supported simultaneously.

COMMUNICATION CONTROL

INTEGRATED COMMUNICATIONS ADAPTER (ICA): Handles up to 10 synchronous or asynchronous lines as an integrated unit on the Century 101 Processor.

621-101 COMMUNICATIONS CONTROLLER: Controls up to 15 lines, at transmission speeds of 45 to 50,000 bits/sec. Has a 16-position priority scanner and single-character buffer. Most I/O control functions must be performed by the Century 100, 101, 200, or 300 Processor. A variety of asynchronous communications adapters and interface devices are available. An adapter is required for each communication line handled. The 621-101 must be connected to a position on a low-speed trunk only.

621-102 COMMUNICATIONS MULTIPLEXOR: Operates as a common trunk peripheral, and has largely been superseded by the 621-103, from which it differs only slightly. Among the primary differences from the 621-103 is the lack of ROM transmission/control character tables that facilitate the handling of transparent code. The 621-102, however, remains in the NCR Century Series product line as of this writing.

621-103 COMMUNICATIONS MULTIPLEXOR: Capable of handling 16 to 256 lines, using 4 ROM transmission/control character tables, centralized character parity assembly and stripping, plus centralized BCC, CRC, and function code control. A Hardware Assisted Software Queue (HASQ) feature is also available to help identify the terminals; this feature is standard with the 621-103 on the Century 300, optional on the Century 101 and 200, and not available for the Century 50 or 100. The 621-103 connects to the common trunk of any Century Series processor. A "bucket" operation capability is also available to permit the transmission of a record of indeterminate length through a hardware technique of using dual buffers. The 621-103 simultaneously handles both synchronous and asynchronous devices using various transmission codes and speeds. Asynchronous devices can operate at 16 speeds ranging from 45 to 2400 bits/sec, and synchronous devices at speeds ranging from 600 to 50,000 bits/sec.

622-601 PROCESSOR INTERCOUPLER: Permits high-speed direct interchange of information between two NCR Century computers at the same site.

692-600 ASYNCHRONOUS ADAPTER: Handles up to 16 transmission speeds ranging from 45 to 2400 bits/second, and permits attachment of popular NCR devices such as the 270 Financial Terminal, 620 General Purpose Terminal, and 399 Accounting Computer (Report 70C-656-11), as well as other non-NCR devices. ➤

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► **693-600 SYNCHRONOUS ADAPTER:** Supports speeds from 600 to 50,000 bits/second for popular IBM binary synchronous (BSC) terminal devices or processor-to-processor communications. Operates under the B2 Software Executive and the BSC application package in IBM 2780 mode. For 16K systems, binary synchronous support is offered in a dedicated mode of operation only. With 32K bytes, a flexible, multitask communications capability is supported.

BINARY SYNCHRONOUS COMMUNICATIONS PACKAGE: This facility equips a Century 50 to act as a remote "satellite" system capable of communicating with a central Century 200 or 300 computer via a single half-duplex or full-duplex line. Data is transmitted in binary synchronous (BSC) mode at a speed of 1800 to 4800 bits per second, using ASCII code. The package includes a multiplexer, a single-line synchronous adapter, and an adapter for the 6101 Input/Output Writer, which is required for system operation in the communications mode. Supporting software enables the Century 50 to receive data from the central Century 200 or 300 system and write it in disc storage, and to read data from disc storage or cards and transmit it to the central system. Software is also available to link the Century 50 to other manufacturers' computer systems.

BASIC-I HARDWARE PACKAGE: This feature equips a Century 50 system with the minimum on-line equipment required for use of NCR's BASIC-I Programming Language. It consists of a multiplexer and a single-line asynchronous adapter. The basic feature supports one remote data terminal; additional terminals can be supported by means of a 692-100 Asynchronous Adapter for each line.

SOFTWARE

OPERATING SYSTEMS: NCR provides four different levels of integrated, disc-resident operating systems for the Century Series computers. Each consists of a Monitor, an Executive, and several other routines. The Monitor controls the sequencing, loading, and linking of programs. The Executive is a run-time supervisor that handles all I/O operations, error conditions, and program overlays. The four levels can be summarized as follows:

BASIC EXECUTIVE (B1): All Century systems can use the basic B1 operating system. This disc-resident operating system handles the batch-mode processing of one program at a time. It was initially delivered in November 1968 with the first Century 100 installations. The B1 system consists of a Monitor, an I/O Executive, and Disc Management, Log, and Display routines.

The Monitor is called into main memory at the start of each day and at the end of each program. It controls the sequencing, linking, and loading of programs. It can run a series of programs as directed by a control string entered via punched cards, punched tape, or the console keyboard. The I/O Executive is divided into a memory-resident portion and a disc-resident portion. The memory-resident portion occupies about 4000 bytes of main memory and handles all I/O operations, error conditions, program overlays, and subroutine calls. The disc-resident routines are called into main memory when needed to deal with less frequent situations such as open and closing of files, retries of I/O operations that failed, etc.

The Disc Management routines are used primarily to ensure that the system discs always contain accurate, up-to-date versions of the NCR software. The Log routines maintain a system disc log of status information such as hardware malfunctions and incorrect operating procedures. The Display routines provide communication links between the operator and either the programmer or the operating system.

DUAL OPERATING EXECUTIVE (B2): Usable on Century 200 and larger systems with at least 32K bytes of main

storage, this operating system divides main memory into two distinct areas. One is dedicated to a single real-time or batch program. The other area is used for sequential processing of batch programs. The B2 system was delivered late in 1969. Its resident portion occupies about 6000 bytes of main storage.

MULTIPROGRAMMING EXECUTIVE (B3): Usable on Century 200 and larger systems with at least 64K bytes and the Multiprogramming Feature, this operating system divides main memory into two or more partitions of at least 16K bytes each. Each partition has its own set of 63 index registers, its own disc unit, and its own job stream, so its operations are largely independent of those in other partitions. The B3 system was delivered late in 1969.

The multiple-partition B3 system is also available in an upgraded version designed to take advantage of the increased hardware capabilities of the Century 300. The principal extensions are: (1) support of operator communications via the CRT display system, and (2) use of a single system disc unit, shared by all active programs, rather than a separate disc unit for each partition. Up to nine jobs can be executed concurrently, each in a separate partition with an independent job stream. Printer output can be spooled (i.e., written on a disc unit for later printing). The upgraded B3 Multiprogramming Executive was delivered with the first Century 300 system in February 1972.

MULTIPROGRAMMING EXECUTIVE (B4): A still more powerful multiprogramming operating system, called B4, is also currently operational on the Century 300. Among the B4 extensions are: (1) spooling of both input and output data, (2) expanded operator communication facilities, with system status displays organized in a hierarchical structure, (3) comprehensive job scheduling and job accounting routines, (4) facilities for inter-job communication among active programs, (5) remote job entry facilities, (6) check-point and restart facilities to aid in recovery from system failures, and (7) dynamic reallocation of peripheral devices and main storage.

COBOL: Three different COBOL compilers are available. All use source language based on ANS COBOL.

STAGE I COBOL: Usable on a basic 16K Century 50 or larger, the Stage I language is a restricted but useful subset of ANS COBOL. Stage I COBOL is upward-compatible with NCR's own Stage II and III COBOL implementations and with any ANS COBOL compiler. The language includes selected elements from the Nucleus, Sequential Access, Random Access, Table Handling, Segmentation, and Library modules of ANS COBOL; the Sort and Report Writer modules are not implemented. Within the Nucleus module, the COMPUTE and EXAMINE statements are not implemented and there are limitations upon the ADD, ALTER, GO TO, MOVE, PERFORM, and SUBTRACT statements. Subscripting and indexing are limited to a single level. Compilation speed, according to NCR, is about 50 or 100 statements per minute on a 16K or 32K Century 100, respectively.

STAGE II COBOL: Usable on a 32K Century 200 or Century 300, the Stage II language consists of the following ANS COBOL modules: high-level Nucleus, Random Access, and Sequential Access; medium-level Table Handling; and low-level Segmentation and Library. Compilation speed, according to NCR is about 100, 200, or 500 statements per minute on a Century 200 with 32K, 65K, or 262K bytes, respectively.

STAGE III COBOL: Usable on a Century 200 or 300 with at least 65K bytes of main memory, the Stage III language is stated to be a complete, high-level implementation of ANS COBOL, including the Sort and Report Writer modules. Compilation speed, according to NCR, is about the same as for Stage II COBOL.

BASIC: A new compiler for BASIC, an algebraic language designed for time-sharing computers, can be used on both ►

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- **Century 200 and 300 systems.** Programs are compiled as they are entered from remote teletypewriters and can be executed immediately. Diagnostic messages permit on-the-spot correction of many errors. An accounting routine facilitates billing by recording the amount of computing time used by each programmer at each terminal.

NCR announced the BASIC-I Programming Language for use with Century 100 systems in April 1971. The package is separately priced and available in two versions, for dedicated and "dual" (share-use) systems. The dedicated version can be used on a 16K Century 50 and accommodates up to 15 data terminals. The dual system requires a 32K Century 50, supports up to 10 terminals, and allows concurrent background processing. The BASIC-I language is a subset that is upward-compatible with the BASIC compiler for the Century 200 and 300 computers.

FORTRAN: Three different FORTRAN compilers are offered:

CENTURY BASIC FORTRAN: Usable on a basic 16K Century 50 or larger, Century Basic FORTRAN is an implementation of the American National Standard Basic FORTRAN language (FORTRAN II), with a number of useful extensions. Among the extensions are: (1) an unlimited number of array dimensions, (2) longer statement labels and symbolic names, (3) an expanded character set, (4) additional I/O format capabilities, and (5) mixed-mode arithmetic.

CENTURY INTERMEDIATE FORTRAN: Usable on a 32K Century 50 or larger, this version includes all of Century Basic FORTRAN plus a number of additional extensions, and is compatible with the "Basic FORTRAN IV" language for the IBM 1130. The 32K version includes tracing and error-checking functions, random disc access, sense light routines, and four additional statements: DATA, EXTERNAL, DEFINE FILE, and Data Type (INTEGER, REAL, DOUBLE PRECISION, COMPLEX, or LOGICAL).

CENTURY FULL ANS FORTRAN IV: Usable on a 32K Century 101 or larger, this full implementation of ANS FORTRAN also includes two popular extensions: mixed-mode arithmetic and an unlimited number of dimensions in an array.

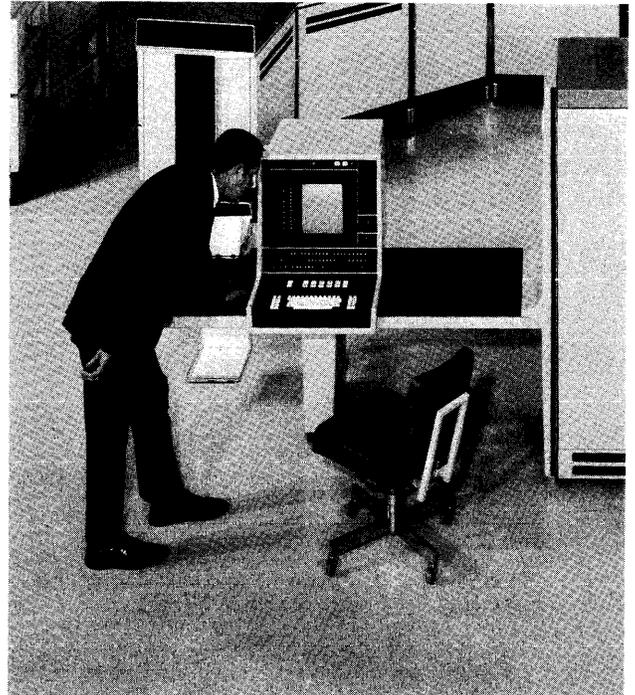
ASSEMBLER: NEAT/3 is the symbolic assembly language for the Century Series. Strong emphasis is placed upon the use of macro-instructions and "Major Functions" to facilitate coding. Major Functions are pre-coded routines to perform common data processing functions such as Accumulate, Collate, and Master File Update; the programmer fills out a questionnaire to tailor these routines to his needs. The disc-oriented NEAT/3 Compiler is usable on all Century systems.

Elementary NEAT is a subset of NEAT/3 that provides an easy-to-learn programming language and faster compilation.

RPG: A bundled RPG compiler is being developed for use on Century 50 through 200 systems with a minimum of 32K bytes of main memory, dual disc units, a printer, and a card reader. First delivery of the RPG compiler is scheduled for April 1973.

NCR 315/RMC TRANSLATOR: Translates programs written in NEAT assembly language for the NCR 315/RMC computer into NEAT/3 source statements for the Century 300. The translator itself runs on the 315/RMC. Input is from punched cards, and output is on either cards or magnetic tape, together with a printed listing. Source statements that cannot be automatically translated are flagged on the listing for manual recoding.

360 BAL TRANSLATOR: This program is designed to translate IBM System/360 Basic Assembler Language (BAL) source programs into NEAT/3 source programs that can be compiled and executed on a Century 300. The translator will handle BAL programs that run under any of the



The Century 300's Operator Communication Center, an integral part of the central processor, includes a CRT display, keyboard, printer, and control panel.

standard IBM operating systems (OS, DOS, TOS, or BOS). Source statements that cannot be automatically translated are flagged on the printed listing for manual recoding.

UTILITY ROUTINES: Both disc and tape sort generators are available. There is also an adequate complement of utility routines to handle file creation, library maintenance (SPUR and OPUR), data transcription, overlay control (OMAP), disc file management, tracing, memory dumps, etc.

APPLICATION PROGRAMS: NCR offers "packaged" programs to handle key applications in manufacturing, food processing, wholesale distribution, retailing, schools, financial institutions, hospitals, and local government. Among the application programs available to users of the Century 50 and larger systems at no extra charge are:

- Retail Accounts Receivable
- Accounts Payable
- Payroll and Personnel Management
- Medical Audit Statistics System (Mass)
- Hospital Accounts Receivable
- Hospital Clinical Analysis
- Inpatient Accounting
- Post-Discharge Accounts Receivable
- Order Entry
- Stewardship and Management Accounting
- Student Scheduling and Grade Reporting
- Student Test Analysis
- Requirements Planning
- Production Scheduling
- Emphasis
- Utility Billing
- Department Store Sales Audit
- General Reporting System
- Project Network Analysis (PNA)
- Basic Estimating Technique (BETS)
- Fashion Reporting
- Stable Stock Replenishment
- CIF-DDA Bank System
- Linear Programming

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► Application packages available to users of the Century 100 and larger systems at no extra charge include:

- General Accounts Payable
- Law Enforcement Control System
- Building Contractors System
- Statistical Analysis
- Personal Trust Accounting
- Dedicated Commercial Bank Inquiry System
- Material Requirements Planning

Packages available to users of the Century 200 and 300 systems at no extra charge include:

- Local Government Administration System
- Bill of Materials Processor
- Manufacturing Inventory Control System

Separately priced NCR software includes (at charges based upon the "value and uniqueness" of each package): a Personal Trust Accounting System for Century 100 or larger systems with at least 32K bytes of main memory (\$20,000 license fee plus \$5,000 one-time installation fee plus expenses and \$500 for each 1,000 trust accounts); COSMOS I for supermarket inventory control (at a price based upon the size of the inventory application); and a Law Enforcement Case Accounting System (with three modules costing \$195 each).

PRICING

CENTURY 50 BASIC SYSTEM: Includes 16K processor, 300-cpm card reader (or 1000-cps punched tape reader), 200-lpm printer, and one dual-spindle disc unit with 153-millisecond average access time (8.4 million bytes total). Monthly rental and purchase prices are \$1,575 and \$88,000, respectively. For purchased systems, monthly maintenance is \$275.

EXPANDED CENTURY 50 SYSTEM: Includes 32K processor with input/output writer, 300-cpm card reader (or 1000-cps punched tape reader), 450/900-lpm printer, and two dual-spindle disc units with 65-millisecond average access time (16.8 million bytes total). Monthly rental and purchase prices are \$3,100 and \$159,500, respectively. For purchased systems, monthly maintenance is \$460.

CENTURY 100 BASIC SYSTEM: Consists of 16K processor, dual-spindle disc unit, 450-lpm printer, and either 300-cpm card reader or 1000-cps punched tape reader. Monthly rental is \$2,500 or \$2,125 under a 1-year or 5-year lease, respectively. Purchase price is \$105,000. For purchased systems, monthly maintenance is \$385.

Most Century 100 systems will also include an input/output writer (console typewriter), which rents for \$100 per month or sells for \$4,800. An additional 16K bytes of main storage rents for \$400 per month or sells for \$18,700.

CENTURY 101 BASIC SYSTEM: Consists of 16K processor, dual-spindle disc unit, 450-lpm printer, and either 300-cpm card reader or 1000-cps punched tape reader. Monthly rental under a 1-year lease is \$2,450, and purchase price is \$114,700. For purchased systems, monthly maintenance is \$365.

CENTURY 200 BASIC SYSTEM: Consists of 32K processor, I/O writer, dual-spindle disc unit, 1500-lpm printer, and either 300-cpm card reader or 1000-cps punched tape reader. Monthly rental is \$4,400 or \$3,740 under a 1-year or 5-year lease, respectively. Purchase price is \$194,500. For purchased systems, monthly maintenance is \$520.

EXPANDED CENTURY 200 SYSTEM: Consists of 128K processor, I/O writer, two dual-spindle disc units, 1500-lpm printer, 800/83-294-cpm card read/punch, and six 144KB magnetic tape units. Monthly rental is \$12,150 under 1-year lease. Purchase price is \$542,000. For purchased systems, monthly maintenance is \$1,095.

CENTURY 300 MEDIUM SYSTEM: Consists of a 512K processor four very high speed trunks, two double-density dual disc units, 1200-cpm card reader, two card punches, and two 1500-lpm printers. Monthly rental is \$26,775 under 1-year lease. Purchase price is \$1,248,150. For purchased systems, monthly maintenance is \$3,300.

SUPPORT: NCR systems support is billed to Century 50, 100, and 101 users at the rate of \$20 per hour or \$120 per day. NCR systems support for the Century 200 costs \$22 per hour or \$132 per day, while support for the Century 300 and/or on-line systems costs \$25 per hour or \$150 per day.

For all Century models, each user is entitled to a maximum amount of "free" NCR support equal to twice the monthly rental of the system. Additional support is billed separately at the above rates.

EDUCATION: All educational services are separately priced. Each Century 50 installation receives a training allowance of \$1,500, which provides approximately 6 man-weeks of training. The user of a basic NCR Century 100 or 200 system receives an educational allowance of \$2,000 or \$3,000, respectively. Courses in excess of the allowance are billed to the customer. The allowances cover basic training for two persons. Every Century 300 installation receives a total educational allowance of \$8,000 over the life of the system, which provides basic training for four people.

CONTRACT TERMS: The standard NCR Century rental contract permits 200 hours of use per month. Occasional extra-shift operation beyond 200 hours per month is billed at the rate of 20% of the hourly rate for the Basic System and 10% of the hourly rate for all additional components. An unlimited-use contract is available at an additional charge of 10% over the basic rental. A 50% purchase option credit applies to all NCR Century Series equipment. ■

NCR Century Series
EQUIPMENT PRICES

	Purchase Price	Monthly Maint.	Rental (1-year lease)*	Rental (3-year lease)*	Rental (5-year lease)*
BASIC SYSTEMS					
Century 50 Basic System, including:					
615-50/616-200	Processor with 16K-byte thin-film memory	88,000	275	1,575	—
640-122	Integrated Printer, 200 lpm, 132 positions				—
655-151	Integrated Dual-Spindle Disc Unit, 8.4 MB, 153-msec access time				—
682-100	Integrated Card Reader, 300 cpm				—
Substitutions for Century 50 Basic System:**					
615-50/616-300	Processor with 32K-byte thin-film memory	18,750	10	400	—
640-102	Integrated Printer, 450/900 lpm, 132 positions	12,000	30	350	—
640-132	Integrated Printer, 300/600 lpm, 132 positions	6,000	15	150	—
655-101	Integrated Dual-Spindle Disc Unit, 8.4 MB, 65-msec access time	5,000	35	150	—
662-100	Integrated Paper Tape Reader, 1000 cps	0	-15	0	—
Century 100 Basic System, including:					
615-100/616-200	Processor with 16K-byte thin-film memory	105,000	385	2,500	2,250
640-102	Integrated Printer, 450/900 lpm, 132 positions				2,125
655-101	Integrated Dual-Spindle Disc Unit, 8.4 MB, 65-msec access time				—
682-100	Integrated Card Reader, 300 cpm				—
Substitutions for Century 100 Basic System:**					
615-100/616-300	Processor with 32K-byte thin-film memory	18,700	10	400	—
640-200/626-101	Printer and Controller, 1500 lpm, 132 positions	35,500	75	925	—
640-205/626-101	OCR Printer and Controller, 750/1500 lpm, 132 positions	38,100	85	1,025	—
640-210/626-101	Printer and Controller, 1500 lpm, 160 positions	39,750	75	1,025	—
640-215/626-101	OCR Printer and Controller, 750/1500 lpm, 160 positions	42,550	175	1,125	—
640-300/626-101	Printer and Controller, 600 lpm, 132 positions	25,450	50	675	—
662-100	Paper Tape Reader, 1000 cps	0	-15	0	—
Century 101 Basic system, including:					
615-101/7001	Processor with 16K-byte core memory	114,700	365	2,450	—
640-102	Integrated Printer, 450/900 lpm, 132 positions				—
655-201/625-101	Dual-Spindle Disc Unit and Controller, 8.4 MB, 65 msec access time				—
682-101	Integrated Card Reader, 300 cpm				—
Substitutions for Century 101 Basic System:**					
615-101/7002	Processor with 24K-byte core memory	7,875	10	175	—
615-101/7003	Processor with 32K-byte core memory	13,500	15	300	—
615-101/7004	Processor with 48K-byte core memory	27,000	25	600	—
615-101/7005	Processor with 64K-byte core memory	40,500	35	900	—
640-102/626-101	Printer and Controller, 450/900 lpm, 132 positions	5,925	0	125	—
640-300	Integrated Printer, 1200 lpm, 132 positions	13,500	25	425	—
640-300/626-101	Printer and Controller, 1200 lpm, 132 positions	17,375	25	550	—
657-102/625-201	Dual-Spindle Disc Unit and Controller, 60 MB, 73 msec access time	41,500	15	875	—
662-100	Paper Tape Reader, 1000 cps	0	-15	0	—
Century 200 Basic System, including:					
615-200/617-100	Processor with 32K-byte thin-film memory	194,500	520	4400	3960
640-200	Integrated Printer, 1500 lpm, 132 positions				3740
655-201/625-101	Dual-Spindle Disc Unit and Controller, 8.4 MB, 153 msec access time				—
682-100	Integrated Card Reader, 300 cpm				—
6101	Integrated Teletype I/O Writer				—
Substitutions for Century 200 Basic System:**					
615-200/617-150	Processor with 48K-byte thin-film memory	28,000	0	690	—
615-200/617-205	Processor with 64K-byte core memory	47,000	0	1,150	—
615-200/617-255	Processor with 96K-byte core memory	88,000	0	2,150	—
615-200/617-305	Processor with 128K-byte core memory	129,000	0	3,150	—
615-200/617-355	Processor with 196K-byte core memory	209,000	25	5,100	—
615-200/617-405	Processor with 256K-byte core memory	289,000	45	7,050	—
615-200/617-455	Processor with 348K-byte core memory	450,000	105	10,950	—
615-200/617-505	Processor with 512K-byte core memory	608,000	170	14,850	—
640-205	Integrated OCR Printer, 750/1500 lpm, 132 positions	2,800	10	100	—
640-210	Integrated Printer, 1500 lpm, 160 positions	4,250	0	100	—
640-215	Integrated OCR Printer, 750/1500 lpm, 160 positions	7,050	10	200	—
640-300	Integrated Printer, 1200 lpm, 132 positions	-10,050	-25	-250	—
657-102/625-201	Dual-Spindle Disc Unit and Controller, 60 MB, 73 msec access time	41,150	15	875	—
662-100	Paper Tape Reader, 1000 cps	0	-15	0	—
Century 300 Basic System, including:					
615-300/618-100	Processor with 128K-byte core memory	432,400	1,350	9,200	—
Substitutions for Century 300 Basic System:**					
615-300/618-200	Processor with 256K-byte core memory	122,200	250	2,600	—
615-300/618-300	Processor with 384K-byte core memory	239,700	500	5,100	—
615-300/618-400	Processor with 512K-byte core memory	352,500	750	7,500	—

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NCR Century Series EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*	Rental (3-year lease)*	Rental (5-year lease)*
PROCESSOR FEATURES						
For Century 50 Processor:						
5622	BASIC-1 Hardware Package for BASIC-1 support (requires 6101 I/O Writer; Feature 6051 not required)	19,500	60	400	—	—
6051	One Common Trunk (required for non-integrated peripherals or communications devices)	7,500	5	150	—	—
6101	Teletype I/O Writer	4,800	15	100	—	—
6105	I/O Writer Selector Switch	200	1	5	—	—
For Century 100 Processor:						
6101	Input/Output Writer	4,800	15	100	—	—
6105	I/O Writer Selector Switch Assembly	200	1	5	—	—
6106	Software Initiated Alarm	400	2	10	—	—
6107	Remote Audible Alarm	800	1	20	—	—
6108	Extra Loud Alarm	800	1	20	—	—
For Century 101 Processor:						
6001	Multiply/Divide	4,500	10	100	—	—
6002	Integrated Communication Multiplexor	7,875	40	175	—	—
6003	I/O Common Trunks 1 & 6	4,500	10	100	—	—
6010	Logic command	2,350	0	50	—	—
6101	Teletype I/O Writer with Interface	4,800	5	100	—	—
6102	Thermal I/O Writer with Interface	7,050	5	150	—	—
For Century 200 Processor:						
6106	Software Initiated Alarm	400	1	10	—	—
6107	Remote Audible Alarm	800	1	20	—	—
6201	Table Compare and Logic Command (requires 6101 Teletype I/O Writer)	2,350	5	50	—	—
6202	Multiply	2,350	5	50	—	—
6204	Floating Point	7,050	10	150	—	—
6207	Console Debug	1,175	5	25	—	—
6208	Extra Loud Alarm	800	1	20	—	—
6209	Multiprogramming (requires 6201 Feature; includes 6212 Octaplex Feature)	14,100	10	300	—	—
6210	One High-Speed Trunk	2,350	5	50	—	—
6211	Two High-Speed Trunks	4,700	5	100	—	—
6212/6211	Octaplex with Two High-Speed Trunks	9,400	5	200	—	—
6213/6201	NCR 315 Compatibility with Table Compare and Logic Command	4,700	5	100	—	—
6214/6201	IBM 1401 Compatibility with Table Compare and Logic Command	5,875	10	125	—	—
6215	Interval Timer	1,200	5	30	—	—
6216	Thermal I/O Writer	2,400	0	50	—	—
6217	Remote Teletype I/O Writer	5,000	10	125	—	—
6218	Remote Thermal I/O Writer	7,400	10	175	—	—
627-201	NCR 315 Emulator Feature (requires Console Debug and 6213 Compatibility Feature)	11,750	32	250	—	—
627-202	IBM 1401 Emulator Feature (requires Console Debug and 6214 Compatibility Feature)	8,000	26	175	—	—
627-203	NCR 315 and IBM 1401 Emulator Feature (requires Console Debug and both 6213 and 6124 Compatibility Features)	18,500	57	400	—	—
For Century 300 Processor:						
618-100	Standalone 128K-byte Core Memory	164,500	300	3,500	—	—
618-200	Standalone 256K-byte Core Memory	286,700	550	6,100	—	—
618-300	Standalone 384K-byte Core Memory	404,200	800	8,600	—	—
618-400	Standalone 512K-byte Core Memory	517,000	1,050	11,000	—	—
6302	Back-Up Memory Ports	6,200	0	135	—	—
6303	Time-of-Day Clock (in core memory)	2,200	0	50	—	—
6304	Four Very High Speed Trunks	11,500	50	250	—	—
MASS STORAGE						
625-101	Controller for up to four 655-201 Disc Units	14,000	15	300	—	—
625-201	Single-Density Controller for up to eight 657-type spindles (available on Century 200 or 300 only; requires High-Speed Trunk on Century 200)	40,250	40	875	—	—
625-202	Dual-Density Controller for up to eight 657-type spindles (available on Century 300 only)	49,450	70	1,075	—	—
655-102	Second Dual-Spindle Disc Unit for Century 50 or 100 only (does not require controller); 8.4 MB, 65 msec access time	28,750	110	625	—	—
655-152	Second Dual-Spindle Disc Unit for Century 50 only (does not require controller); 8.4 MB, 152 msec access time	26,500	75	550	—	—
655-201	Common Trunk Disc Unit; (requires 625-101 controller) 8.4 MB, 65 msec access time	26,500	115	600	—	—
955-1	Disc Pack for 655-type disc units, 4.2 MB	350	0	11.50	—	—
657-101	Single-Spindle Disc Unit, 30 MB or 48 MB. (48 MB capacity requires 625-202 Controller; 30 MB capacity requires 625-201 or -202)	26,450	90	575	—	—

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NCR Century Series EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*	Rental (3-year lease)*	Rental (5-year lease)*
MASS STORAGE (cont)						
657-102	Dual-Spindle Disc Unit, 60 MB or 96 MB (96 MB capacity requires 625-202 Controller; 60 MB capacity requires 625-201 or -202)	41,400	100	900	—	—
6571	Add-on Drawer to convert 657-101 to 657-102	14,950	10	325	—	—
957-1	Disc Pack for 657-type disc units; 30 MB or 48 MB	525	0	20	—	—
653-101	CRAM Unit, 145 MB	60,000	140	1,250	—	—
623-201	Control Unit for up to 8 CRAM Units	14,000	20	300	—	—
INPUT/OUTPUT UNITS						
624-111	Controller for up to eight 633-111 and/or 633-121 Magnetic Tape Units	21,000	20	450	—	—
624-119	Controller for up to eight 633-119 Magnetic Tape Units (available for Century 50 with 6051 feature)	14,000	20	300	—	—
624-211	Controller for up to eight 633-211 Magnetic Tape Units	24,000	20	500	—	—
624-179	Controller for up to eight 633-119 and/or 633-117 Magnetic Tape Units with same speeds (requires 6101 feature on Century 50, 100 or 101; available for Century 50 with 6051 Feature)	16,500	20	350	—	—
624-311	Controller for up to eight 633-311 Magnetic Tape Units	25,500	20	550	—	—
633-111	Single Magnetic Tape Unit; PE, 80KB, 9-track, 1600 bpi	19,500	60	400	—	—
633-117	Single Magnetic Tape Unit; NRZI, 10/28/40KC, 7-track, 200/556/800 bpi (available for Century 50 with 6051 feature)	17,000	65	350	—	—
633-119	Single Magnetic Tape Unit; NRZI, 40KB, 9-track, 800 bpi (available for Century 50 with 6051 feature)	17,000	65	350	—	—
633-121	Dual Magnetic Tape Unit; PE, 80KB, 9-track, 1600 bpi	36,000	90	750	—	—
633-211	Single Magnetic Tape Unit; PE, 144KB, 9-track, 1600 bpi (requires high-speed trunk; not available for Century 100)	24,000	60	500	—	—
633-311	Single Magnetic Tape Unit; PE, 240KB, 9-track, 1600 bpi (requires high-speed trunk; not available for Century 100)	25,500	60	550	—	—
680-201	Card Reader, 1200 cpm	32,500	120	650	—	—
686-102	Card Read/Punch, 800/83-294 cpm	24,000	115	500	—	—
686-111	Card Read/Punch, 560/60-180 cpm (available for Century 50 with 6051 feature)	20,500	115	400	—	—
686-201	Card Reader, 750 cpm (available for Century 50 with 6051 feature)	14,750	75	300	—	—
686-302	Card Punch, 83-294 cpm	20,500	115	400	—	—
686-311	Card Punch, 60-180 cpm (available for Century 50 with 6051 feature)	14,750	115	300	—	—
687-301	Card Punch and Controller, 100 cpm	15,500	95	325	—	—
660-101	Paper Tape Reader, 1500 cps (available for Century 50 with 6051 feature)	14,750	35	300	—	—
665-101	Paper Tape Punch, 200 cps (available for Century 50 with 6051 feature)	18,000	55	375	—	—
640-102	Printer, 450/900 lpm, 132 positions (requires 626-101 Controller)	27,500	60	575	—	—
640-200	Printer, 1500/3000 lpm, 132 positions (requires 626-101 Controller for Common Trunk attachment to Century 100, 200, or 300 only)	49,000	110	1,200	—	—
640-205	OCR Printer, 750/1500 lpm, 132 positions (requires 626-101 Controller for Common Trunk attachment to Century 100, 200, or 300 only)	51,800	120	1,300	—	—
640-210	Printer, 1500/3000 lpm, 160 positions (requires 626-101 Controller for Common Trunk attachment to Century 100, 200, or 300 only)	53,250	110	1,300	—	—
640-215	OCR Printer, 750/1500 lpm, 160 positions (requires 626-101 Controller for Common Trunk attachment to Century 100, 200, or 300 only)	56,050	120	1,400	—	—
640-300	Printer, 1200 lpm, 132 positions (requires 626-101 Controller)	38,950	85	950	—	—
626-101	Printer Control Unit for Common Trunk attachment of 640-102, 640-200, 640-205, 640-210, 640-215, or 640-300 Printer to Century 100, 200, or 300; and 640-102 or 640-300 to Century 101	14,000	25	300	—	—
6401	6/8 Lines Per Inch for 640-102 Printer	1,000	0	25	—	—
6402	Continuous Form Tab Set Handling Feature for 640-200 Printer	300	2	13	—	—
670-101	MICR Sorter, 600 dpm, 11 pockets (includes 622-401 Controller; available for Century 50 with 6051 feature)	45,000	150	990	—	—
671-101	MICR Sorter, 1200 dpm, 18 pockets (includes 622-401 Controller; not available for Century 50 or 100)	117,500	530	2,350	—	—
6711	Endorser Feature for 671-101	12,000	45	300	—	—
420-1	Optical Character Reader (requires 622-301 Controller)	48,000	184	1,200	—	—
420-2	Optical Character Reader (requires 622-301 Controller)	68,000	265	1,700	—	—
622-301	OCR Control Unit for 420-1 or 420-2 Reader	7,000	10	150	—	—

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NCR Century Series EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*	Rental (3-year lease)*	Rental (5-year lease)*
INPUT/OUTPUT UNITS (cont)						
622-201	Controller for 735/736 Magnetic Tape Encoders having special Century compatibility feature (available for Century 50 with 6051 feature)	8,250	10	175	—	—
622-601	Processor Intercoupler	14,750	30	300	—	—
COMMUNICATION CONTROL						
621-101	Communications Multiplexor (15 lines)	15,000	40	300	—	—
621-102	Communications Multiplexor (250 lines)	22,750	45	475	—	—
6921	End of Message Feature for 621-102 Only	950	0	20	—	—
690-101	Auxiliary Cabinet for 621-101	2,500	0	50	—	—
690-201	Auxiliary Cabinet for 621-102	12,500	5	250	—	—
692-100	Asynchronous Character Adapter for 621-101 or 621-102.	3,250	10	65	—	—
621-103	Communications Multiplexor (256 lines)	12,000	35	200	—	—
692-600	Asynchronous Adapter for 621-103	1,500	7.50	75	—	—
693-600	Synchronous Adapter for 621-103	2,250	7.50	100	—	—
691-101	Secondary Cage for 621-103	7,500	8	120	—	—
690-103	Auxiliary Bay	8,000	3	160	—	—
691-102	Secondary Cage for 690-103	7,500	9	120	—	—
692-401	Asynch. Polling Adapter for 621-101/102; 1 line/cage	5,000	10	100	—	—
692-402	Asynch. Polling Adapter for 621-101/102; 2 lines/cage	7,000	15	140	—	—
692-403	Asynch. Polling Adapter for 621-101/102; 3 lines/cage	8,250	20	165	—	—
692-405	Terminal Adapter for 621-101/102; 1 line cage	4,800	15	100	—	—
692-406	Terminal Adapter for 621-101/102; 2 lines/cage	6,700	20	140	—	—
693-200	735/736 Encoder Adapter for 621-101/102	8,250	15	175	—	—
693-300	General Purpose Synchronous Adapter for 621-101/102	7,750	25	160	—	—
6901	Transparency Feature	675	0	15	—	—
6902	Wide Band Feature	450	0	10	—	—
694-201	Voice Response Adapter for 621-101/102; 1 line/cage	4,800	15	100	—	—
694-202	Voice Response Adapter for 621-101/102; 2 lines/cage	8,200	20	175	—	—
798-100	Voice Response Unit	24,200	40	525	—	—
7981	Voice Source Assembly Feature for voice source redundancy	6,500	0	150	—	—
7982	Output Module Feature for two additional channels	1,200	0	25	—	—
7983	Expansion Cage Feature for more than 10 channels	2,400	10	50	—	—
7984	Power Supply Feature for more than 28 channels	650	0	15	—	—
—	Voice Film — 1st Copy	300	0	—	—	—
—	Voice Film — Each Add'l. Copy	50	0	—	—	—
5621	Century 50 Binary Synchronous Communication Package (requires 6101 I/O Writer; feature 6051 not required)	20,500	75	425	—	—

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