

# Univac BC/7 Family

## MANAGEMENT SUMMARY

Introduced in January 1977, the BC/7 is a stand-alone data processing system designed for first time computer users and those using accounting machines. Initially offered in 16 packaged configurations, the BC/7 has since grown into a family of four upward-compatible models.

The current line consists of the diskette-based BC/7-600; the cartridge-disk-based BC/7-700, which is similar to the original BC/7 offering; the BC/7-800, the first multi-programming model; and the BC/7-900, the largest model of the family that features support for up to 256K bytes of memory, four levels of multiprogramming plus spooling, and faster access and cycle times and more disk storage capacity than the BC/7-800.

On February 1, 1978, just over a year after the system was introduced, Sperry Univac announced the expansion of the BC/7 into a family of three series structured to provide a lower entry level and greater growth potential. The three new series are the diskette-based BC/7-600; the cartridge-disk-based BC/7-700, which is similar to the original BC/7; and the BC/7-800 multiprogramming series.

The entry-level BC/7-600 is characterized as being entirely diskette-served, with no magnetic tape or cartridge disk drives. The BC/7-700 systems are cartridge-disk-based and can also utilize magnetic tape for file storage and I/O, as well as diskettes for I/O. The BC/7-800 systems are also cartridge-disk-based and can use all the mass storage ➤

Univac has expanded its popular BC/7 Business Computer into a family of four series designed to appeal to both entry-level and larger-volume users. Models range from diskette-based systems to multi-terminal, multi-programming systems at prices from less than \$17,000 to about \$41,000.

**MAIN MEMORY:** 48K to 256K bytes.  
**DISK CAPACITY:** 2.0 to 140 million bytes.  
**WORKSTATIONS:** 1 to 8.  
**PRINTER:** 200 cps to 600 lpm.  
**OTHER I/O:** Magnetic tape, punched card, diskette.

## CHARACTERISTICS

**MANUFACTURER:** Sperry Univac Division, Sperry Rand Corporation, P.O. Box 500, Blue Bell, Pennsylvania 19424. Telephone (215) 542-4011.

Sperry Rand Corporation is international in scope, employing approximately 98,000 people worldwide. There are six operating divisions providing the following products and services: Sperry Univac designs, develops, manufactures, and markets computer systems and office equipment such as electric typewriters and automatic filing systems; Sperry New Holland manufactures and markets specialized farm equipment; Sperry Vickers produces hydraulic pumps, motors, and valves used in mobile, marine, industrial, and aerospace equipment; Sperry Division is involved with marine and aerospace navigation, guidance, and control systems, and is a leader in computerized traffic control; Sperry Flight Systems manufactures navigation, guidance, and control systems, and ➤



*This middle-of-the-line BC/7-700 system includes 64K bytes of main memory, one workstation, and a 5-million-byte double density disk drive. The purchase price is \$21,800.*

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▷ devices available with the BC/7-700, but the larger systems offer twice as much main storage, support two additional workstations, and feature an enhanced version of the IOS operating system that is capable of supporting two concurrently executing applications programs, concurrent print spooling, and roll-out of either application program.

Highlighting the expansion of the BC/7 line is a new processor for the BC/7-800. The new 3048 processor supports up to 128K bytes of MOSFET memory and up to six workstations. Pricing for the entire line was restructured, and the initial charge for software products was dropped.

Built around Intel 8080 microprocessors, the 3038 and 3048 CPU's are both made up of a control processor and a macro processor. The control processor is an 8-bit parallel binary processor with an 8-bit accumulator, six 8-bit programmable work/index registers, and an 8-bit external data path. It has 16-bit immediate operators for initializing the work/index registers and a 16-bit double-precision capability. There is a 16-bit program counter and a 16-bit programmable stack pointer that uses part of main storage as the stack store.

The control processor has a basic "time state" of 500 nanoseconds. A minimum instruction contains one "machine cycle" consisting of four time states. Instructions can contain from 4 to 18 time states and take between 2 and 9 microseconds to execute. The external address space is directly addressable via the 16-bit address bus. The general address space contains 65,536 locations and has four modes of addressing: direct, immediate, register, and register indirect. An 8-line automatic priority interrupt facility allows the processor to respond to internal or external events; the contents of the program counter are automatically saved. The internal machine code is 8-bit ASCII.

The BC/7 macro processor is a microprogrammed processor designed to execute interpretively macro-level operations generated by the RPG II compiler. The macro processor resides in the processor complex, interfacing with the system bus in the same fashion as the direct memory access facilities and the control processor; it also has a control interface with the control processor. The macro processor is activated by special operation codes in the programs being run. Upon activation, the macro processor puts the control processor in a wait or halt state until it completes the required function. Upon completion, the results of that function are stored in main storage, and the control processor resumes processing.

The system bus is the center of transfer between all devices on the BC/7, including the CPU and main storage, main storage and I/O devices, and the CPU and I/O devices. The bandwidth is 1 million bytes per second; but to achieve this rate, the CPU must be locked out during the transfers. By stealing machines cycles, a transfer rate of 400K bytes per second can be handled with minimum CPU slowdown. Typical instruction mixes permit trans-▷

▷ instruments used in commercial aviation, civilian non-airline aviation, military aircraft, and space vehicles; and Sperry Remington is involved in the consumer areas of electric shavers, hair stylers, and other related products.

**MODELS:** BC/7-600, BC/7-700, BC/7-800, and BC/7-900 Series of small business systems.

**DATE ANNOUNCED:** Original BC/7, January 1977; BC/7 Series, February 1978.

**DATE OF FIRST DELIVERY:** March 1977.

### DATA FORMATS

**BASIC UNIT:** 8-bit byte with two decimal digits or one character per unit.

**INSTRUCTIONS:** The BC/7 is a microprocessor-based system that uses a secondary-level processor to execute macro-level operations generated by the RPG II and ESCORT compilers. The user does not have an assembler-type language available to him.

**INTERNAL CODE:** ASCII.

### MAIN STORAGE

**TYPE:** Dynamic MOS, the contents of which are refreshed at intervals of 32 microseconds.

**CYCLE TIME:** For the BC/7-600, 700, and 800, 1 microsecond per 8-bit fetch, with a 500-nanosecond access time; for the BC/7-900, 1 microsecond per 2 byte fetch, with a 500 nanosecond access time.

**CAPACITY:** 49,152 or 65,536 bytes of semiconductor main memory for the BC/7-600 and BC/7-700; 131,072 bytes for the BC/7-800.

**CHECKING:** Main storage will generate a parity bit for each 8-bit byte of write data received from the CPU via the data bus. The parity bit is stored with the data byte and checked when the data is read. If a parity error is detected, the main storage module will generate an interrupt to the CPU. If an attempt is made to address a nonexistent storage location (a storage card that is not plugged into the BC/7), an addressing error will result.

### CENTRAL PROCESSOR

Two processors are used with the BC/7 family systems — the 3038 in the BC/7-600 and BC/7-700, and the 3048 in the BC/7-800 and BC/7-900.

The Model 3038 central processor used in the BC/7-600 and BC/7-700 Series systems consists of a control processor, a macro processor, and the system bus.

The control processor is an 8-bit parallel binary processor with an 8-bit accumulator, six 8-bit programmable work/index registers, and an 8-bit external data path. It features 16-bit immediate operators for initializing the work/index registers, a 16-bit double precision capability, 2-digit decimal arithmetic calculation, a 16-bit program counter, and a 16-bit programmable stack pointer that can use any part of main storage as the stack store. The stack consists of 98 16-bit-wide slots. The stack automatically saves the contents of the program counter when certain transfer instructions are executed. These instructions are used when interrupts occur and for calling subroutines.

The external address space (up to 65,536 locations) is directly addressable via the 16-bit bus. There are four addressing modes: direct, immediate, register, and register indirect. ▷

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PERIPHERALS/TERMINALS

DEVICE	DESCRIPTION & SPEED	MANUFACTURER
<b>MAGNETIC TAPE EQUIPMENT</b>		
0871	Uniservo 10 Magnetic Tape; 9-track; standard 1/2-inch tape, 800/1600 bpi, NRZI or PE, 25 ips; 20/40 KBS; single or dual density	Univac
<b>PRINTERS</b>		
0781-99	Impact Printer; 125 lpm (64-character set) or 85 lpm (96-character set); 132 positions, 8 or 10 lines per inch, 4- to 17.5-inch paper	Univac
0781-97	Same as 0781-99 but 250 lpm or 175 lpm	Univac
0784-99	Line Printer; 700 lpm (48-character set), 600 lpm (64-character set), or 430 lpm (96-character set); 132 positions, 6 or 8 lines per inch, interchangeable print cartridges	Univac
0784-96	Same as 0784-99 but 350, 300, and 215 lpm	Univac
0786-99	Receive-Only Matrix Printer; 200 cps; 7 x 7 matrix; 132 positions, 6 lines per inch, unidirectional	Univac
0786-97	Same as 0786-99 but bidirectional	Univac
0791-91	Correspondence Quality Printer; prerequisite is 0781, 0784, or 0786 printer	Univac
<b>PUNCHED CARD EQUIPMENT</b>		
0719	Reader; 80-column; 1000 card hopper/stacker capacities each; 300 or 600 cpm; maximum two per system	Univac
(-97, -99)		
0608-96	Card Punch; 28- or 80-column; 700 card input/output stacker capacities each; 75 or 160 cpm	Univac
<b>TERMINALS</b>		
3545	Workstation; 12-inch CRT, 1920 characters, 24 lines by 80 characters; typewriter-style keyboard; 7 x 9 dot matrix, 13-key numeric pad and control keys; optional modem interface for remote workstation	Univac

➤ fer rates of up to 600K bytes per second without significant CPU slowdown.

The BC/7 workstation is a CRT keyboard/display unit equipped with its own microprocessor and 4K bytes of ROM (read-only memory) and 8K bytes of RAM (random-access memory). Data validation takes place at the workstation. Common operator errors are detected immediately and the operator notified. Further data entry is rejected until the operator corrects the error.

The BC/7 is oriented primarily toward interactive operation. Batch work can be accommodated by means of diskettes and disk cartridges, but the majority of system usage will involve input and output through the CRT/keyboard(s). The system runs under an operating system designated the Interactive Operating System (IOS). User application programs, written in UNIVAC RPG II or ESCORT, communicate with IOS whenever I/O operations are required, for job initiation and termination, for file management and control, and for general resource management. IOS was designed for use by people with little or no data processing experience. Dialog between IOS and the user is accomplished via short and simple English commands, and the system makes extensive use of menu selection techniques and a fill-in-the-blanks method of data entry.

➤ The Model 3048 central processor used in the BC/7-800 Series systems includes 131,072 bytes of MOSFET memory, comprised of 16K-bit chips with a 1-microsecond cycle time. The larger memory is supported by a memory controller, a hardware memory protect feature, and a complement of 15 registers: two 16-bit system registers, seven 8-bit system registers, and six 8-bit general-purpose registers. The 3048 CPU also includes two additional workstation controllers, for a system total of six. Other characteristics are the same as those of the 3038 CPU.

The Model 3048-52 central processor used in the BC/7-900 system includes 262,144 bytes of MOSFET memory with a cycle time of 1 microsecond per two byte fetch. The memory controller and memory protect feature, and register complement is the same as the 3048 CPU.

The control processor has a basic "time state" of 500 nanoseconds. A minimum instruction takes one "machine cycle" of four time states. BC/7 instructions can contain from 4 to 18 time states, and take between 2 and 9 microseconds to execute.

The BC/7 macro processor is a microprogrammed processor designed to interpretively execute macro-level operations generated by the RPG II and ESCORT compilers and to optimize the execution of these programs. The macro processor interfaces with the system bus in the same fashion as the direct memory access (DMA) facilities and the control processor, and it also has a control interface with the control processor.

➤ The macro processor is activated by special operation codes in the program being run. Upon activation, the macro

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▷ BC/7 utility programs include editors, sort/merge, data file service programs, program file service routines, system support facilities, and direct data entry routines.

ESCORT is a high-level, general-purpose application language developed for interactive use with the BC/7 systems. ESCORT uses English-language directives and has two modes of operation: a tutorial or basic mode, and a program or advanced mode. In the tutorial mode the user receives step-by-step guidance through the program development process, while in the program mode the user can write programs directly at the workstation by simply entering ESCORT statements. In operation the user can alternate between the two modes at will, utilizing the faster program mode when using familiar directives and reverting to the tutorial mode only when he needs to use new or unfamiliar techniques.

BC/7 programs can also be written in the RPG II programming language. Univac's RPG II is "industry compatible" (i.e., essentially compatible with IBM RPG II). Source code is entered via a workstation, and programs are developed and compiled using the RPG II editor and compiler, respectively. Univac chose RPG II as a programming language for the BC/7 family because of its support for a wide variety of applications, its broad popularity, and the large base of programmers already trained in the language.

A number of application programs are available for the BC/7 systems, including an integrated wholesaler/distribution accounting system, a sales accounting system, a manufacturers' accounting system, and systems for general accounting, accounts payable, accounts receivable, and payroll.

To complement the application programs offered with the BC/7 systems, Univac has introduced a programming technique it calls the PIXIE method. PIXIE enables the user to define names and computational methods outside the application programs, so that the programs themselves can be adapted to the user's operations without modification. All Univac-supplied application programs are written so that a call is made to the PIXIE method at each point where a calculation is required that may be installation-dependent. Users incorporate their own specific needs within application programs through an interactive question-and-answer method. Specifications, report headings, use of trade and field names in the master file, and unique methods of calculation for many variables can be incorporated into the programs via the PIXIE technique.

The BC/7 family of business computers is a product of the Sperry Univac Office Equipment Division, offered through its Business Systems Marketing organization, which has fully staffed sales and service offices in 27 major U.S. metropolitan areas. The product line is also marketed through sales offices in major cities in Canada and Europe. With the introduction of the BC/7-600, BC/7-700, and BC/7-800 systems, Sperry Univac has strengthened its commitment to the small business computer market.

▶ processors put the control processor in a wait or halt state until it completes the required function. Upon completion of the function, the result is stored, and the control processor resumes.

The system bus is the center of transfer between all devices on the BC/7, including the CPU and main storage, main storage and I/O devices, and the CPU and I/O devices. The bandwidth of the bus is 1 million bytes per second, but to achieve this maximum rate, the CPU must be locked out during the transfers. By stealing machine cycles, a transfer rate of 400K bytes per second can be achieved with minimum CPU slowdown. Typical instruction mixes permit transfer rates up to 600K bytes per second without significant CPU slowdown.

An external device can gain control of the system bus to make data transfers directly to or from storage. An automatic priority circuit assigns the bus to any device except main storage on a cycle stealing or instruction overlap basis. Bus contention is resolved by hardware priority logic.

**INTERRUPTS:** An 8-line automatic priority interrupt facility allows the processor to respond to internal or external events. The contents of the program counter are automatically saved in the stack when an interrupt occurs.

**PHYSICAL SPECIFICATIONS:** The BC/7 console and main electronics are housed in a single-pedestal desk. The desk functions as the control center and a general work area. The CPU and other electronics are housed in the pedestal. A raised portion of the left rear corner of the desk contains a 5-inch CRT screen that presents data on two 16-character lines and displays system status messages to the operator. A group of pressure-sensitive buttons allows for initial program loading and operator communications with the BC/7. The desk also contains space to house up to six diskette units. The desk is 48 inches wide, 30 inches deep, and 34 inches high.

The system can be operated on 120, 208, or 220 volts (except that the magnetic tape drives use 220 volts only, while the workstations use 120 volts only). A typical system including two workstations, two cartridge disk drives, and a line printer, requires approximately 2.0 KVA. The operating environment ranges from 50 to 93 degrees F., with a humidity tolerance ranging from 20 to 85 percent, non-condensing. Normal air conditioning is adequate. The typical system described above dissipates about 7000 BTU's of heat per hour.

Service area and general machine requirements indicate the need for a floor area with about a three-foot clearance around the system. A typical system requires about 300 square feet including clearance.

### INPUT/OUTPUT CONTROL

The input/output structure of the BC/7 family permits the exchange of data and control information between the CPU, main storage, and peripheral devices over the shared system facility, the system bus. Peripheral devices are interfaced through discrete controllers, which monitor and maintain overall supervision of the devices that are attached.

The Direct Memory Access controllers (DMA's) interface high-speed mass storage devices such as diskette, cartridge disk, and tape units to the BC/7 systems. All DMA's are buffered and contain the logic and timing required to initiate commands and control the transfer of data to or from the devices. The disk DMA's share their resources among the attached devices. Commands that do not require the use of data transfer resources permit concurrent operations on more than one device. Commands requiring the transfer of data make the controllers busy to any additional commands until the data transfer is completed.

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### ▷ USER REACTION

Fourteen users of BC/7 systems, representing a total of 16 installed systems, responded to Datapro's 1980 survey of computer users. Included were two 600's, three 700's, and eleven 800 systems. The average length of time these systems were installed was 21 months.

Main memory capacities ranged from 64K to 128K bytes and the largest disk storage capacity was 20 megabytes. The average number of workstations per system was 2.7. One user reported six workstations on line to the BC/7-800 he had installed.

The principal applications reported for these systems were accounting and payroll/personnel. Applications programs were being written by in-house personnel at ten of these sites, seven users had purchased "ready-made" programs, four were using contract programmers, and three were using proprietary software packages.

The ratings assigned by these users are shown in the following table:

	Excellent	Good	Fair	Poor	WA*
Ease of operation	6	6	0	2	3.1
Reliability of mainframe	4	6	4	0	3.0
Reliability of peripherals	0	8	3	2	2.5
Maintenance service:					
Responsiveness	4	5	4	1	2.9
Effectiveness	2	8	1	3	2.6
Technical support:					
Trouble-shooting	2	6	3	3	2.5
Education	0	5	4	5	2.0
Documentation	0	3	7	3	2.0
Manufacturer's software:					
Operating system	2	8	2	2	2.7
Compilers & assemblers	4	6	3	1	2.4
Application programs	0	5	3	0	2.6
Ease of programming	3	8	2	1	2.9
Ease of conversion	3	4	2	2	2.7
Overall satisfaction	4	6	2	2	2.9

\*Weighted Average on a scale of 4.0 for Excellent.

Comments from this group of users were minimal. On the negative side, six users said that the system proposed by the vendor was too small and had to be replaced or expanded, and five users commented that Univac did not provide all the promised software or support. One of the users who complained about the software added that the "Operating system bad at first, is now Excellent."

On the positive side, nine users said the system was easy to expand/reconfigure, while seven said that productivity aids helped them keep programming costs down. Ten of the fourteen users responding said that they would recommend the system to another user in their situation. □

▶ **The Shared Direct Memory Access (SDMA) controllers interface low/medium-speed peripheral devices, such as workstations and printers, to the system bus. The SDMA's**

are capable of interfacing a maximum of six such devices to the BC/7-600 and -700 systems; four on the first SDMA and two on the second. The BC/7-800 and -900 can have two additional workstation controllers, for a system total of eight low/medium-speed devices.

The controller shares its resources among the attached devices. During operation it is possible to have all SDMA devices operating concurrently. When data becomes available, the SDMA causes an interrupt to be generated and a data transfer sequence to be initialized. The SDMA interfaces those devices that are buffered and transfers data to and from the system in device records. Once a data transfer sequence has been initialized by the system, a single SDMA remains busy to any system or device request until the data transfer is completed, but the other SDMA is available for use.

The Microcoded Communications Line Adapter (MCLA) is used when two BC/7 systems are connected via communications lines. The MCLA accommodates one communications line.

### CONFIGURATION RULES

All BC/7 systems have four Direct Memory Access (DMA) I/O channels (or ports: P0, P1, P2, and P3). Each DMA channel has clearly defined options, depending on the series.

**On the BC/7-600 Series:** P0 has a DDMA-II; P1 may have either a DDMA-II or a DDMA-I; P2 may have an MCLA; and P3 has the primary SDMA.

**On the BC/7-700, -800, and -900 Series:** P0 has a cartridge disk DMA (CDMA); P1 may have a DDMA-II or a DDMA-I or a CDMA or a magnetic tape DMA (TDMA) or an MCLA; P2 may have either an expansion SDMA or an MCLA; and P3 has the primary SDMA.

Following from the DMA channel options, the following rules apply to each type of DMA, regardless of series (unless otherwise noted):

The DDMA-II interfaces dual-sided, double-density, 1-million-byte diskette drives. The first DDMA-II accommodates four such drives; a second accommodates two more drives.

A DDMA-I will handle single-density, industry-compatible diskette drives.

The first CDMA accommodates 5, 7.5, 10, 15, or 20 million bytes of cartridge disk storage. A second CDMA will handle an additional 10 or 20 million bytes.

A TDMA accommodates two Uniservo 10 magnetic tape drives.

The required workstation is attached to the primary SDMA, which accommodates a complement of four low/medium-speed devices (printers, card readers, card punches, or additional workstations). On the BC/7-600 and -700, a second SDMA allows another two such devices; on the BC/7-800 and -900, another four. In either case, the number of workstations must be at least two less than the maximum complement of SDMA devices. Further, there may be no more than two of any other SDMA device.

Only one MCLA can be attached to a BC/7 system. An optional dual communications interface can be used with the MCLA for alternate use of two lines with different modems and facilities. ▶

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### ► MASS STORAGE

**MODEL 2366 AND 2898 DISKETTE UNITS:** Both models of floppy disk units are housed in the BC/7 desk, which contains space for up to six drives. Each Model 2366 drive accommodates one industry-compatible, single-density diskette capable of storing up to 242,944 bytes on 74 data tracks, each containing 26 128-byte sectors. Each Model 2898 drive accommodates one dual-sided, double-density diskette capable of storing up to 485,888 bytes on each side, a total of 971,776 bytes on 148 data tracks, each containing 26 256-byte sectors. In either case, the user may define a physical record (or "section") of up to 4 sectors, giving a single-density maximum record length of 512 bytes and a double-density maximum of 1024 bytes.

The average rotational delay for both drives is 83.3 milliseconds. For the industry-compatible drive, the data transfer rate is 31,250 bytes/second; positioning time ranges from 16 milliseconds (track-to-track) to 624 milliseconds maximum; average positioning time is 213 milliseconds; and average access time (positioning time plus rotational delay) is 297 milliseconds. For the dual-sided, double-density drive, the data transfer rate is 62,500 bytes/second; positioning time ranges from 18 to 246 milliseconds; average positioning time is 92 milliseconds; and average access time is 175 milliseconds.

**2380 CARTRIDGE DISK UNITS:** These are housed in a cabinet that contains a CDMA and provides room for two units, each having one fixed disk and one removable disk. The 2380 units are available in single- or double-density versions (100 or 200 tracks per inch, respectively). The single-density recording mode is compatible with the IBM 5444 Type 1 or A1 drives. Recording is on four surfaces in each unit, two on the fixed disk and two on the removable disk. Single- and double-density drives can be intermixed on one BC/7 system, but a separate CDMA and cabinet are required for each type. There are four models of the 2380 available.

Model	Fixed Disk Capacity, Bytes	Removable Disk Capacity, Bytes	Density
2380-91	2.5 million	2.5 million	Single
2380-99	2.5 million	2.5 million	Double
2380-97	5.0 million	2.5 million	Double
2380-95	5.0 million	5.0 million	Double

Up to four double-density cartridge disk units can be attached to a BC/7 system, providing a maximum storage capacity of 40 million bytes. Only one single-density unit is permitted per system. The recording surface is organized into 24 sectors of 256 bytes each, and the data transfer rate is 312.5K bytes per second. Head positioning time ranges from 9 to 60 milliseconds for the single-density versions and from 10 to 65 milliseconds for the double-density versions. Average positioning times are 35 and 40 milliseconds, and average access times are 47.5 and 52.5 milliseconds, respectively.

**8402 SEALED DISK SUBSYSTEM:** Used with the BC/7-900 only, the 8402 subsystem includes an input/output processor (IOSP) which contains a 32K byte microprocessor and a printer interface. The 8402 contains a sealed fixed disk with a capacity of 50, 75, or 100 million bytes. The unit connects directly to one of the mass storage channels on the BC/7. The recording surface is organized into 52 sectors of 256 bytes each. The average head positioning time is 35 milliseconds and average rotational latency is 8.3 milliseconds. The data transfer rate is 1,198,000 bytes per second.

### INPUT/OUTPUT UNITS

See the Peripherals table for units other than the BC/7 workstation, which is described below.

**WORKSTATION:** A CRT keyboard/display unit equipped with its own microprocessor and 4K bytes of ROM and 8K bytes of RAM memory. The Model 0774, a 300-cps non-impact printer, is optional for hard-copy output. The CRT's 12-inch screen displays up to 1920 characters arranged in 24 lines of 80 characters each. A total of 96 symbols, including upper and lower case alphabets, are displayed in green. The typewriter-style keyboard is detachable and includes a numeric keypad.

A protected field feature of the BC/7 workstation enables the operator to enter data only into those fields that are designated by the controlling programs. The workstation positions the cursor on the field to be entered and, upon entry, verifies and edits each field as entered, giving the operator immediate validity checking.

The first workstation normally sits on the BC/7 processor desk unit. Additional workstations can be directly cable-connected at distances up to 1000 feet from the processor. Workstations located at longer distances must be modem-connected, using telephone lines or a Univac modem substitute and a specially installed coaxial cable. Communication rates can vary from 2000 to 9600 bits per second, depending on the communications link chosen.

### COMMUNICATIONS CONTROL

The Microcoded Communications Line Adapter (MCLA) permits BC/7 to BC/7 or BC/7 to host data communications using a Univac modem, Univac modem substitute, or equivalent commercially available synchronous modems and facilities. A dual communications interface can be selected for alternate use of two lines with different modems and facilities. Transmission rates can vary from 2000 to 9600 bits per second. Automatic answering is optional.

### SOFTWARE

**OPERATING SYSTEM:** The *Interactive Operating System (IOS)* is the only operating system offered by Univac for the BC/7 family. Requiring 16K bytes of main memory, IOS functions as the system executive and as a large utility program servicing the user programs. User application programs written in RPG II or ESCORT communicate with IOS whenever input/output operations are required, for job initiation and termination, for file management and control, and for general resource management, through standard interfaces. Designed for use by those not schooled in data processing techniques, IOS offers a number of features to make man-machine communication as simple as possible. These include:

- Short and simple command formats.
- English dialog between the operator and the system.
- The ability to change previously written and stored procedures at run time through the introduction of parameters.
- Menu selection techniques.
- Utilities are run in step-by-step fashion.
- Application programs can also operate in step-by-step mode, with each step graphically explained.
- All data entry for application programs is done using a "fill in the blanks" method.
- Validity checking of data for type, ranges, etc., is done at input time.
- User data is protected by passwords assigned by the user. ►

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► The BC/7-600 and BC/7-700 systems run their software in two program partitions. Partition 1 is used for general application and utility programs, and partition 2 is used to run either concurrent data entry or a program communicating with another BC/7. One workstation can be attached to the program in partition 1, and up to three additional workstations can be used to enter data, building transaction files for later use by the application programs. A concurrent inquiry function also permits searching for specific records while an application program is running and accessing the same file.

A "roll-out" feature in IOS permits a higher-priority request from a workstation to cause a lower-priority program currently running to be moved out of main storage to a reserved area on disk, whereupon the higher-priority request is responded to by a program which is brought into main storage from the system library disk. The program that was rolled out is automatically resumed after the request has been satisfied.

IOS ranges in size from 0.5 megabytes to 1.5 megabytes. On a diskette-based system it can reside on one diskette drive. The disk operating system requires approximately one megabyte of disk storage.

IOS for the BC/7-800 and -900 is functionally similar to that for the BC/7-600 and -700 except for the following enhancements:

- Multiprogramming in two 48K-byte partitions (BC/7-800).
- Multiprogramming in four 48K-byte partitions (BC/7-900).
- Print spooling and output writer functions.
- Expanded rollout/rollin capability (BC/7-800).
- File sharing for update operations.
- Support for up to six workstations (BC/7-800).
- Support for up to eight workstations (BC/7-900 with 8402 Disk Subsystem and no MCLA in configuration).
- System control workstation (BC/7-900).
- Remote printer operations.

**SYSTEM CONTROL LANGUAGE:** SCL is a parameterized program that runs under IOS and functions as the interface between the system and the operator. The SCL program facilitates system operation via displayable lists of job functions or menus that guide the workstation operator in selecting specific, predefined job procedures stored on disk (or diskette). Once a procedure has been selected, the operator is requested to key its corresponding parameters by a fill-in-the-blanks dialog that defines the job. User-generated programs are prepared in RPG II or ESCORT.

SCL commands specify programs to be executed, identify the files to be used, and aid in debugging. The commands can be keyed in at a workstation or read from a disk. In general, the operator will neither see nor need to know SCL or the rules of syntax for the language, since predefined procedures are stored on disk and the operator chooses the correct procedure from a list, or menu. Menu selection can be several levels deep, so that the choice of an item from the main menu can cause another menu to be displayed that offers still more specific choices. After selection of a procedure, parameters can be introduced into the job stream from the workstation, thereby allowing general-purpose procedures to be written. Both the menu items and the requests for parameters are in English text. SCL commands

are divided into seven categories: job definition, SCL control, system control, utility program support, language processor calls, and disk support. SCL commands added to accommodate the enhancements to BC/7-800 and -900 IOS involve file-sharing, program priorities, and spooling options.

As a system security feature, the user can impose restrictions, in the form of limited menu selection, to various users. A user may, for instance, have access to certain information in a file (e.g., name, address) but be unable to run a program that would change other fields (salary, hourly rate, etc.) in the same file.

**FILE MANAGEMENT SYSTEM:** FMS, running under IOS, implements the management of data files, program libraries, system files, working files, and the system file catalog. It provides the interface through which system and user programs request I/O operations and assures program independence from specific device details. FMS provides support for sequential, direct, and indexed file structures; its independence from specific device details. FMS provides support for sequential, direct, and indexed file structures; its functions include opening files, closing files, retrieving records, writing records, controlling certain functions of I/O, specifying input/output buffering, waiting for the completion of input/output operations, and loading indexed files. Each file contains a file definition table that describes the characteristics of the logical file, identifies options to be invoked by file management, and contains the addresses of the program's I/O buffers, record work areas, and function parameter areas. Programs interface with FMS via I/O control calls; file openings and closings, buffering, and blocking/deblocking are FMS functions. Logical records can be blocked into physical records, which are file sections of 256, 512, 768, or 1024 bytes. A file section is equivalent in size to the program I/O buffers used by the file. The user can build or process records in the program I/O buffers or move them to or from user-program-assigned record work areas to perform the operations. These functions are also handled by FMS via subroutines.

The system file catalog, maintained by utility programs and FMS, is a master directory that contains information about all files and libraries within the system. The catalog is maintained on disk.

**UTILITIES:** BC/7 family utility programs, called via special SCL commands, include editors, sort/merge, data file service programs, program file service routines, system support facilities, and direct data entry routines.

The editors are provided to enable the building and maintenance of SCL procedures, source elements, and data files. A special editor is forms-oriented for RPG II source language work. The editors allow the user to create new elements either from scratch or through copying pieces of other elements.

The SORT utility program allows the user, through sequence specification parameters, to rearrange, omit, and reformat records from any type of file, and to output the results to any type of file through the use of a temporary work file created and controlled by the sort package. Basically, three types of sorts are supported: record sorts, address-out sorts, and summary sorts.

Data file service routines enable the manipulation of disk data files. They include programs to copy a volume, a file, or selected records of a file to another volume or file, to reorganize a file, to delete files, to reset the contents of a file to zeros, and to rename files.

Program file service routines are provided to enable the user to create and maintain programs. These routines enable the ►

## Univac BC/7 Family

► user to reserve space for a library or disk or change the size of the reserved space, delete a library or program within a library, copy a library, create an element, rename an element, add or replace elements by name in a library, add, replace, or delete records in an element, or print a library or selected elements.

System support facilities are provided as aids in debugging, fault detection, and general system operation. They include disk preparation, alternate track assignment or build, and build or modify procedures.

The data entry software supports the creation and maintenance of data files keyed from a workstation and stored on diskette or cartridge disk. Record formats, used to define fields and specify validity checks, reside in a disk library and are handled under the control of a format description utility program, which also supports format editing functions such as deletion and/or modification of an entry format element. The five modes of the data entry facility are: data enter, data update, data search/modify, data verification, and data output/display. The software supports up to four workstations operating simultaneously in any mode, and variable-length records of up to 256 characters can be handled.

**LANGUAGES:** Programs to be run under the BC/7 family's Interactive Operating System can be written in either the Univac RPG II or ESCORT programming language.

*Univac RPG II* is "industry-compatible" (i.e., essentially compatible with IBM RPG II). It provides file-oriented processing capabilities for local operations. Source code is entered via a workstation, and programs are developed and compiled using the RPG editor and compiler, respectively. Sequential, indexed, and random processing are supported. Workstations are supported as files by the standard RPG II input and output specifications, and can be used as primary, secondary, or demand files.

*ESCORT* is a new high-level, general-purpose application programming language developed for interactive use by users of the BC/7 systems. ESCORT programs can be developed for generating reports, entering data, processing transactions, making file inquiries, and maintaining data files.

A significant feature of ESCORT is that it has two modes of operation. In the tutorial or basic mode, the user is guided step-by-step, via a prompting and diagnostic program, through the program development process. In the program or advanced mode, the user can write programs directly at the workstation by simply entering ESCORT statements. The program mode requires a knowledge of the language and its formal properties because the user must know the syntax, but since ESCORT uses English-language directives, this is a fairly simple learning process. The user can alternate at will between the two ESCORT modes. When problems are encountered in the program mode, the user can simply revert to the tutorial mode and be guided through those elements of program development that prove to be difficult.

Using ESCORT, the user can write programs to create, replace, or add records to a file; create fill-in-the-blanks routines; validate input data; replace, remove, update, sort, or merge records; select data by field values or a combination of values; direct output to a workstation, printer, or disk; and list or total certain fields.

### COMMUNICATIONS SOFTWARE

**IBM 3270 EMULATOR:** Announced in July 1980, provides the capability to connect up to four BC/7 workstations via one partition and an MCLA to an IBM host computer or any other host supporting IBM 3270's, with each workstation concurrently emulating a 3270 display.

This enables BC/7 workstations to interactively interrogate and update files and run applications or jobs on an IBM mainframe, as well as running normal BC/7 jobs in other partitions. In addition, the emulator offers the standard 3270 capability to be able to copy from screen to screen and screen to printer, and to be able to direct print from the host to the printer.

The initial release of the emulator will be restricted to emulating only the IBM 3271 Control Unit Model 2 (Remote, BSC, EBCDIC CRC96, 1920 character screen support) and the IBM 3277 Display Station Model 2, Typewriter Keyboard (1920 character screen, attached to IBM 3271 Model 2).

**RPG DATA COMMUNICATIONS:** Designed to enable OEM devices such as printers with special characteristics, paper tape equipment, and keyboard devices such as Teletype and Telex terminals to be connected to the BC/7 system.

Input and output of the connected devices can be processed directly by programs written in RPG. This is achieved by a special program that is initialized and loaded into the MCLA using an SCL command, and some features in the RPG compiler. A feature in the MCLA enables it to support the connection of asynchronous devices. The software handles half-duplex operation at speeds up to 9600 bps.

**APPLICATION SOFTWARE:** A number of application packages are available. Along with these application programs, Univac offers a programming technique it calls the PIXIE method. PIXIE enables the user to define names and computational methods outside the application programs, enabling the programs' functions to be adapted to the user's specific operations without modifying the original programs themselves. All Univac-supplied application programs are written so that a call is made to the PIXIE method at each point where a calculation is required that may be installation-dependent.

All programs running on the BC/7-600 and BC/7-700 systems are object-compatible with the BC/7-800 and -900. However, in order to take advantage of the enhancements to IOS for the larger system, it may be necessary to alter SCL job streams, recompile programs, or slightly modify programs.

The *Accounting Management System (AMS)* consists of a General Ledger (GL) module, an Accounts Payable (A/P) module, an Accounts Receivable (A/R) module, and a Payroll module. GL provides for the control of accounting records, including an audit trail of entries and the balancing and validation of all bookkeeping entries. With the General Ledger module, balance sheets are maintained and income statements are produced. The Accounts Payable module includes all functions needed to create checks and maintain posting distribution for GL. The files contain all required information on vendors, such as name, address, all purchases for the current year's business, purchase agent's number, vendor salesman name, and telephone number. Even payments outside the A/P can be posted to the GL and check register listing. The Accounts Receivable module includes all functions needed to bill and maintain the A/R files. The files contain all required information on customers, such as name, address, balance, discount, tax information, aging, credit limits, month-to-date, year-to-date, and prior year sales, and order information. The Payroll module offers a number of attractive features for the user and provides the following reports: payroll edit list, payroll register, checks, W-2 and 941 forms, master file list, and the next period's worksheet.

The *Wholesale Application Management System (WAMS)* is designed to give the user complete control of the order, ►

## Univac BC/7 Family

► **billing, and inventory processes.** WAMS includes modules for order entry, modification or deletion of open orders on order records that have not been invoiced, reprinting of invoices and invoicing on open orders, sales journals, updating the item master file following the performance of the daily recap report, production of the daily recap report, removal of deleted order records from the disk files, checking of status of invoiced orders, and preparation of open order reports.

The *Sales Application Management System (SAMS)* is functionally the same as WAMS, except that the inventory module is not provided. All other aspects of order entry and receivables are included.

The *Manufacturing Application Management System (MAMS)* provides information for management use in optimizing resources and improving cash flow. MAMS currently consists of Bill of Material/Inventory Control, Scheduled Receipts, Product Costing, and Material Requirements Planning.

### PRICING

**POLICY:** Since February 1980, Univac has offered the BC/7 Family systems for outright sale only. The published lease prices apply only to existing long term lease customers who order additional equipment or exchange equipment in accordance with the terms of their agreement. Univac offers state and local government and educational discounts of up to 5 percent. Both state and local governments and accredited educational institutions may elect to receive the institutional discount or quantity discounts, but not both.

Quantity discounts are based on the number of CPU's purchased, all of which must be scheduled for delivery within the specified time-frame from the delivery date of the first system. The quantity discount schedule is shown in the following table:

System Quantity	Delivery Period (Months)	Discount (%)
2-5	9	3
6-10	12	5
11-20	15	8
21-30	18	10
31-49	24	15
50 or more	*	20**

\*To be determined by Sperry Univac.

\*\*BC/7-610 and -710 5 MB System 15%; all others 20%.

The maintenance service schedule covers customer engineering preventive and remedial equipment maintenance. The customer can only contract for the same consecutive 9-hour period per week day—8 a.m. to 5 p.m.—which entitles the customer to "on-call" remedial maintenance. Both lease schedules require the customer to execute a maintenance service schedule for all equipment under lease. Monthly maintenance charges commence with monthly equipment charges.

**SOFTWARE AND SUPPORT:** Univac will not sell any software products outright to the customer, and the customer may only use the Univac software as long as a software license is in effect. BC/7 program products are offered under a "Paid-Up" license only. The initial charges and monthly license charges shown in the Software Prices section at the end of this report are applicable to expansion business permitted under the terms of existing agreements.

Univac offers a discount on Program Products to any customer ordering two or more BC/7 systems. As each system is installed, it will qualify all units for the respective allowance of the total number of installed units. There is no retroactive allowance for any of the previously installed units. The following payment schedule applies to the monthly or paid-up license charge of each Program Product installed:

Quantity of BC/7 Systems Installed	Program Product Allowance
2 thru 4	2% per installed system
41 and over	80% maximum

Univac will provide maintenance contract coverage only for the Principal Period of Maintenance (PPM) consisting of the same consecutive nine hour period per day between the hours of 7 A.M. and 6 P.M., Monday through Friday, excluding holidays, for the monthly rates specified in the Equipment Prices section. Maintenance outside of the PPM or Saturday costs \$44 per man hour, and on Sunday or holidays \$54 per man hour.

**EQUIPMENT:** The components and prices of numerous packaged configurations of the BC/7 systems are listed in the Equipment Prices section that follows.■

## EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)	Rental (5-year lease)
3038-38	BC/7 System; CPU with disk, communication line adapter, operator display and switches, power supply, 48K memory, SDMS, space for 1 to 3 dual or 2 to 6 single diskette drives	\$11,975	\$ 60	\$ 331	\$275
<b>BC/7-600 PACKAGED SYSTEMS</b>					
3038-95*	BC/7-32K System; includes CPU with 32K memory, SDMA, one workstation, DDMA unit, six .5-million-bytes diskette drives with power supply	13,695	111	N/A	319
3038-30*	BC/7-610 System; includes CPU with 48K memory, SDMA, one workstation, two DDMA units, dual 1-million-byte diskette drives with power supply, and 200 cps bi-directional, 64-character printer	17,162	169	N/A	396
3038-36*	BC/7-611 System; includes CPU with 48K memory, SDMA, one workstation, one DDMA unit, two dual 1-million-byte diskette drives with power supply	16,200	107	498	408
<b>BC/7-700 SYSTEMS</b>					
3038-34*	BC/7-700 System; includes CPU with 64K memory, SDMA, one workstation, disk cabinet, cartridge DDMA unit, and 5-million-byte double-density drive	21,800	161	646	532
<b>BC/7-800 SYSTEMS</b>					
3048-62*	BC/7-800 System; includes CPU with 128K memory, SDMA, one workstation, disk cabinet, cartridge DDMA unit, and 20MB double-density disk drive (5MB removable, 15MB fixed)	34,900	231	1,026	844

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### EQUIPMENT PRICES

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>Rental (1-year lease)</u>	<u>Rental (5-year lease)</u>
<b>BC/7-900 SYSTEMS</b>					
3048-57*	BC/7-900 System; includes CPU with 256K memory, SDMA, one workstation, disk cabinet, cartridge DDMA, and 20MB disk drive (5MB removable, 15MB fixed)	40,100	263	1,180	968
	*These configurations cannot be supported by Sperry Univac without a Sperry Univac printer to satisfy support requirements				
<b>SYSTEM OPTIONS</b>					
3038-97	CPU with desk, operator display and switches, power supply, 32K bytes of memory, one workstation, one SDMA	14,185	70	372	353
F2309-00	Expansion SDMA	344	2	10	8
F2307-01	16K storage expansion	900	5	45	39
F2900-02	16K storage expansion	900	5	45	39
F2863-00	64K storage expansion	3,500	11	101	83
F2896-99	Conversion kit; 64K to 128K	3,500	11	101	83
F3423-99	BC/7-900 Conversion; converts BC/7-800 system (128K) to BC/7-900 system (256K)	6,000	32	203	167
<b>DISKETTE SUBSYSTEMS</b>					
<b>(SINGLE-SIDED RECORDING)</b>					
F2310-00	Diskette DMA; affords access to up to four (.5MB each) diskette drives; double-density	930	5	29	25
F2310-01	Diskette DMA; same as F2310-00 but for single-density, IBM 3740-format diskettes	930	5	29	25
F2365-00	Two double-density diskette drives (.5-byte capacity each), with power supply for four additional drives; requires F2310-00	3,032	27	85	74
F2365-04	Single diskette drive (.5-byte capacity), with control and power supply for three additional drives; requires F2310-01 DDMA	1,877	16	52	45
F2366-00	Single diskette drive (.5-byte capacity); same as F2365-04 but power supply is shared	1,155	11	33	29
<b>(DOUBLE-SIDED RECORDING)</b>					
F2897-98	Diskette DMA with two 1-million-byte, double-sided diskette drives; control and power supply for four additional drives	3,820	32	138	113
F2898-99	Diskette DMA; one 1-million-byte, double-sided diskette drive; power supply of F2897-98 is shared	2,295	16	78	64
F2898-00	One 1-million-byte diskette; power supply of F2897-98 is shared	1,525	11	60	49
<b>CARTRIDGE DISK SUBSYSTEM</b>					
<b>(BC/7-700 AND BC/7-800)</b>					
8408-88	Cartridge disk cabinet with one 2.5-million-byte fixed disk and the drive spindle for one 2.5-million-byte removable disk cartridge	7,700	80	223	183
8408-84	Same as 8408-88; except each drive stores 5 million bytes	12,500	102	364	298
8408-80	Same as 8408-88; except with two 5-million-byte fixed disks and the drive spindle for two 5-million-byte removable disks	22,100	198	642	526
F2380-88	2.5-million-byte expansion	1,700	11	46	38
F2380-86	5-million-byte expansion; 5 to 10MB (8404-88)	4,800	21	139	114
F2380-83	5-million-byte expansion; 10 to 15MB (8404-88)	7,800	82	232	190
F2380-95	10-million-byte expansion	9,600	96	279	229
<b>(BC/7-800 AND BC/7-900)</b>					
8408-58	Cartridge disk cabinet with one 15-million-byte fixed disk and the drive spindle for one 5-million-byte removable disk cartridge	18,000	140	518	425
F2980-99	10-million-byte expansion; includes 5-million-byte fixed disk and drive spindle for one 5-million-byte removable disk cartridge	9,600	70	279	229
F2823-08	10-million-byte expansion; fixed disk	5,500	45	160	131
F2980-95	20-million-byte expansion; includes 15-million-byte fixed disk and drive spindle for one 5-million-byte removable disk cartridge	13,000	115	378	310
<b>MAGNETIC TAPE UNITS</b>					
0871-00	Uniservo 10 tape drive; single-density, 9-track	12,145	65	250	190
0871-01	Uniservo 10 tape drive; dual density, 9-track	13,425	72	280	210
F3123-00	Uniservo 10 dual density; adds 9-track NRZI to Phase Encoded tape unit	1,280	6	30	20
F2312-00	Tape Direct Memory Access (TDMA); permits control for reading/writing in PE and NRZI mode, housed in processor, controls two tape drives (max.)	4,200	21	100	75

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## EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)	Rental (5-year lease)
<b>TERMINALS</b>					
3545-99	Direct Workstation CRT/keyboard; includes numeric pad, control keys, and cables; 24 lines by 80 characters	3,225	24	95	78
3545-94	Remote Workstation; same as 3549-99 but remote; includes modem interface	3,225	24	95	78
F2997-00	Remote Printer Attachment; provides interface between a direct workstation or a remote workstation to a remote printer; requires 131 KB of main storage in 600 or 700 CPU	1,200	6	32	25
F2997-01	Remote Printer Attachment; same as F2997-00, except for 800 and 900 CPU	1,700	6	32	25
<b>PRINTERS</b>					
0786-99	Receive only matrix printer, 200 cps; 132 positions, 7 x 7 dot matrix, unidirectional	5,238	32	150	125
0786-97	Same as 0786-99 but bidirectional	7,290	54	212	174
F2696-99	Upgrade 0786-99 to bidirectional	2,052	21	62	49
0781-99	Impact Printer; 125 lpm (64-character set) or 85 lpm (96-character set); 132 positions	9,850	75	287	235
0781-97	Same as 0781-99 but 250 lpm (64-character set) or 175 lpm (96-character set)	11,975	96	348	285
0784-99	Line Printer; 700 lpm (48-character set), 600 lpm (64-character set) or 430 lpm (96-character set); 132 positions	25,000	171	588	441
0784-96	Same as 0784-96 but 350 lpm (48-character set), 300 lpm (64-character set) or 215 lpm (96-character set); 132 positions	17,480	91	410	308
F2635-00	Speed upgrade for 0784-96 to speeds of 0784-99	7,520	80	178	133
0791-91	Correspondence Quality Printer; prerequisite is 0781, 0784, or 0786 printer	6,550	63	230	172
<b>CARD EQUIPMENT</b>					
0719-97	Reader; 80 column cards, hopper/stacker capacities are 1000 cards each; 300 cards per minute (cpm)	6,060	37	155	116
0719-99	Reader; same as 0719-97, except 600 cpm	7,000	43	178	134
F2329-00	Speed upgrade (300 cpm to 600 cpm)	940	5	23	17
0608-96	Card Punch; 80 or 28 columns, hopper/stacker capacities are 700 cards each; 75 or 160 cpm	13,352	81	344	256
F2830-00	Read capability; provides card reading ability at 160 cpm for the 0608-96 card punch	648	5	15	13
<b>COMMUNICATIONS</b>					
F2377-99	MCLA; requires F2592-XX	1,400	9	35	31
F2592-99	RS-232 interface	600	—	15	13
F2592-98	MIL STD 188-100 interface	600	—	15	13
F2376-99	Dual RS-232 interface	1,200	5	30	27
F2376-96	Two-line MIL STD 188-100 interface	1,200	5	30	27
F2377-00	Binary Synchronous Capability (BSC)	325	2	9	7
F2304-00	Synchronous Modem; 2000 bps	1,781	12	47	35
F2304-01	Same as F2304-00, except 2400 bps	1,781	12	47	35
F2592-97	Interface for CCITT V.24	600	—	15	13
F2376-97	Two-line CCITT V.24 interface	1,200	—	30	26
F2305-00	Automatic answering for F2592-99 and F2376-99	178	1	4	3
R2004-00	Auto answer	178	1	4	3
8543-00	Direct connect module; free-standing modem replacement device; operates half- or full-duplex for synchronous transmission at 2400, 3600, 4800, 7200, or 9600 bps	748	—	29	25

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SOFTWARE PRICES

	<u>Paid-Up License Charge</u>	<u>Monthly License Charge*</u>	<u>Initial Charge**</u>
General Ledger	\$1,554	\$ 37	\$186
Accounts Receivable	1,806	43	216
Accounts Payable	1,722	41	204
Payroll	2,058	49	246
Order Entry/Billing	2,772	66	330
Inventory/Sales Analysis	2,310	55	276
Bill of Material/Inventory Control	3,276	78	390
Scheduled Receipts	3,024	72	360
Material Required Planning	3,024	72	360
Product Costing	2,268	54	270
RPG II	1,764	42	—
Escort	2,520	60	—
Expanded Sales Analysis	1,512	36	180
Order/Billing	1,764	42	210
Inventory System	1,764	42	210
Order Entry/Billing	2,772	66	330
Inventory/Sales Analysis	2,310	55	276
Accounts Receivable	1,806	43	216
Order Entry/Billing	2,772	66	330
Inventory/Sales Analysis	2,310	55	276
Accounts Receivable	1,806	43	216
Order Entry/Billing	2,772	66	330
Inventory/Sales Analysis	2,310	55	276
Accounts Receivable	1,806	43	216
Order Entry/Billing	2,772	66	330
Inventory/Sales Analysis	2,310	55	276
Accounts Receivable	1,806	43	216
Payroll/Cert. Payroll	3,024	72	360
Accounts Payable	2,184	52	285
Accounts Receivable	2,016	48	240
Job Costing	4,746	113	564
RPG II Data Communication	630	15	72

\*BC/7 Program Products are offered under a "Paid-Up" license only. The Initial Charge and Monthly License Charges listed above are only applicable to expansion business permitted under the terms of existing agreements.

\*\*Initial Charge applies to Monthly License only.