Burroughs B 1700

MANAGEMENT SUMMARY

On June 7, 1972, Burroughs introduced the most significant new line of small-scale data processing systems to reach the marketplace since IBM unveiled the System/3 in July 1969. Although the distinctions among the computer "generations" are becoming increasingly blurred and disputable, the B 1700 Systems more clearly deserve to be called "fourth generation" systems than any other computers introduced to date. Burroughs has managed to incorporate, into systems which rent for just $1,500 to $10,000 per month, nearly all of today's most advanced hardware and software concepts, including semiconductor main memories, integrated-circuit logic, dynamically variable microprogramming, automatic multiprogramming, and virtual memory.

The B 1700 product line currently consists of three central processors—the B 1712, B 1714, and B 1726—and a fairly broad array of peripheral equipment, including both 96-column and 80-column card equipment, low-cost disk cartridge drives, and a variety of other devices which are new to the Burroughs line. Software support centers on the Master Control Program, a comprehensive disk-based operating system, and includes compilers for the COBOL, RPG, FORTRAN, and BASIC languages. In addition, a library of Business Management Systems includes programs for most of the common applications in manufacturing, wholesaling, distribution, banking, and hospitals. A new, unbundled pricing plan imposes separate charges for technical support, education, and all software except the MCP and utility routines.

At announcement time, approximately 25 of the B 1700 Systems were already operating within the Burroughs ➢

The innovative B 1700 Systems, priced from $1,500 to $10,000 per month, offer small-scale computer users a host of "fourth generation" features. Most significant is their "variable micrologic", which enables the processor to adapt itself dynamically to the characteristics of each programming language.

CHARACTERISTICS

MANUFACTURER: Burroughs Corporation, Burroughs Place, Detroit, Michigan 48232. Telephone (313) 972-7083.

MODELS: B 1712, B 1714, and B 1726 Data Processing Systems.

MAIN STORAGE

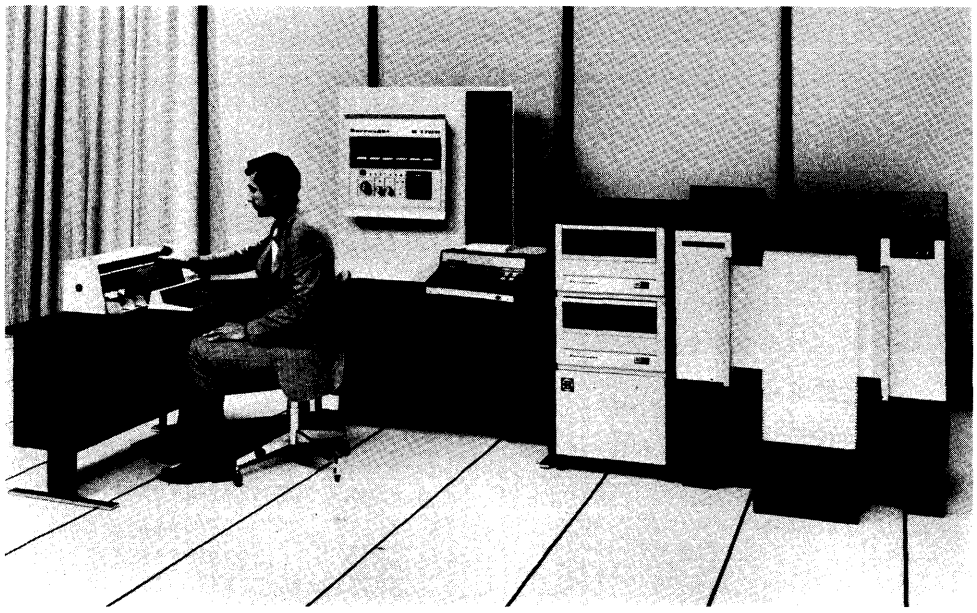
STORAGE TYPE: MOS/LSI semiconductor.

CAPACITY: B 1712–16,384 to 40,960 eight-bit bytes in 8,192-byte increments; B 1714–16,384 to 65,536 bytes in 8,192-byte increments; B 1726–24,576 to 98,304 bytes in 8,192-byte increments to 65K and 16,384-byte increments thereafter.

CYCLE TIME: See table.

CENTRAL PROCESSORS

The B 1700 Series processors feature dynamically variable microprogrammed logic and bit-addressable memories. In the power-down state, according to Burroughs, the processors have no defined structure. For each programming language, Burroughs has defined an "ideal machine" and developed a specialized microprogram, called an Interpreter, that makes the B 1700 logically equivalent to that machine. The Interpreter executes the instructions which have been generated by the appropriate compiler. These compiler-generated instructions are expressed in an "S Language." Because the S Language and its Interpreter are oriented toward the characteristics of each programming language, Burroughs states that on the average only about one-tenth as many S operators will need to be executed to ➢



This basic B 1700 configuration consists of (from left): 96-column card reader/punch equipped for off-line use as a data recorder, central processor with console printer, dual disk cartridge drive, and line printer.

Burroughs B 1700

organization. Customer deliveries of systems using the B 1712 and B 1714 Processors will begin in the third quarter of 1972, and initial B 1726 deliveries are scheduled for the first quarter of 1973.

The most innovative feature of the B 1700 Systems is their "variable micrologic", an advanced form of microprogramming that alters the central processor's logical operations to suit the characteristics of each programming language. The central processors are "soft" machines that have essentially no defined structure until the appropriate microprograms are loaded to control their operations. Main memories which are addressable down to the individual bit level provide great flexibility in data field lengths and, according to Burroughs, will yield increases of 20 to 40 percent in the efficiency of memory utilization for most applications.

It is clear that Burroughs has not shown its full hand to date. The B 1700 central processors are, essentially, "universal emulators" that should be capable of executing programs written for virtually any other computer at a relatively high level of efficiency. But at this writing, the only emulation feature that has been announced is a Burroughs B 300 Series Emulator for operation on the B 1726 Processor. Burroughs will probably test the market and develop the emulation programs for which the demand is highest. Best bets for future emulation, considering the marketing orientation of the B 1700 Systems, are the IBM 360/20, IBM 1400 Series, IBM System/3, Honeywell Series 200, NCR Century Series, and UNIVAC 9000 Series. The B 1700 architecture also forms an excellent basis for future expansion, both upward and downward, and additional processor models can be expected in the not-too-distant future.

The general characteristics of the three B 1700 processors are summarized in the accompanying table. The low-cost B 1712 is quite limited in the types and speeds of I/O devices that can be connected and is restricted to a maximum of 18.4 million bytes of disk cartridge storage; purchase prices of typical B 1712 systems will range from about $70,000 to $120,000, with monthly lease prices ranging from $1,500 to $2,800. The intermediate B 1714 Processor is twice as fast as the B 1712 and accommodates a considerably wider range of peripheral equipment; typical B 1714 systems will range from about $75,000 to $200,000 in purchase price and from $1,600 to $3,500 in monthly lease price. The B 1726 system heads the current B 1700 family in processor performance, mass storage capacity, and I/O speeds; typical B 1726 systems will range from about $135,000 to $475,000 in purchase price and from $3,000 to $10,000 in monthly lease price. (To all these prices, of course, prospective users must add the cost of Burroughs' newly unbundled software and support.)

perform a given function as in typical machine-level computer programs.

Under MCP II control, it will be possible for programs written in two or more languages to run concurrently in a multiprogramming mix. In this case, all of the corresponding Interpreters will reside in main memory, and the B 1700 will be able to change rapidly from one state to another (e.g., from a "COBOL machine" to a "FORTRAN machine") whenever the MCP transfers control from program to program. The Interpreters, S code, and user data are all location-independent.

The B 1700 main memories are addressable to the bit level and utilize no preferred word or byte boundaries. Variable instruction and operand lengths permit from 1 to 65,536 bits of data to be addressed with a single instruction. According to Burroughs, this feature yields a 20 to 40 percent reduction in memory requirements for typical programs.

The three B 1700 Series processor models are program-compatible and generally similar in architecture, with one major exception. In the B 1712 and B 1714 Processors, all microprograms reside in main memory along with the compiler-generated S code and user data. The faster B 1726 Processor has 2,048 or 4,096 bytes of high-speed Control Memory that is used exclusively for microprogram storage. The Control Memory holds the most frequently used portions of the resident MCP and the currently active Interpreters, while the remaining portions reside in main memory.

PERFORMANCE: Burroughs states that the three B 1700 processors will deliver from 1.15 to 5 times the internal processing speed of the IBM System/3. No execution times for individual instructions have been released to date.

INPUT/OUTPUT CONTROL

I/O CHANNELS: Each type of peripheral device or subsystem requires a different I/O control, and each I/O control, in turn, requires an appropriate "slot" in the central processor. The maximum number of I/O controls is 8 in all three of the B 1700 Series systems. All I/O controls are buffered to permit overlapped read/write/compute operations.

CONFIGURATION RULES: Every B 1700 Series system must include a console printer and a disk subsystem.

A B 1712 system can include a maximum of one console printer, one 9480 or 9481 Disk Cartridge subsystem (2.3 to 18.4 million bytes), any two punched card I/O units, one line printer, and one 10KB magnetic tape subsystem. The I/O Expansion Feature is required when more than five I/O controls are used.

A B 1714 system can include a maximum of one console printer, two 9480 or 9481 Disk Cartridge subsystems, any two punched card I/O units, one line printer, one MICR reader-sorter, one magnetic tape subsystem (10KB, 18KB, or 36KB), and two single-line data communications controls. When a MICR reader-sorter is included, the maximum number of disk subsystems is reduced to one. The I/O Expansion Feature is required when more than five I/O controls are used and/or when either two disk subsystems or both a disk subsystem and a MICR reader-sorter are used.

The B 1726 Processor has five different types of I/O subsystem "slots", which determine the number and types of I/O controls that can be connected. The basic processor contains the following slots: 2 Type A, 2 Type B, 1 Type C, 1 Type D, and 2 Type E. The optional I/O Expansion Feature adds the following slots: 2 Type A, 2 Type B, and 1 Type C. A maximum of two I/O Expansion features can be installed in a B 1726 Processor.

Burroughs B 1700

CHARACTERISTICS OF THE B 1700 SYSTEMS

	B 1712	B 1714	B 1726
CENTRAL PROCESSORS			
Processor cycle time, nanoseconds	500	250	167
Maximum number of I/O controls	8	8	8
MAIN MEMORY			
Minimum capacity, bytes	16,384	16,384	24,576
Maximum capacity, bytes	40,960	65,536	98,304
Read cycle time, microseconds	2.0	1.0	0.667
Write cycle time, microseconds	3.0	1.5	1.0
Bits fetched per cycle	Up to 24	Up to 24	Up to 24
CONTROL MEMORY			
Minimum capacity, bytes	None	None	2,048
Maximum capacity, bytes	None	None	4,096
Read cycle time, nanoseconds	–	–	167
Write cycle time, nanoseconds	–	–	225
Bits fetched per cycle	–	–	Up to 16
MAXIMUM I/O SPEEDS			
80-column card reading	300 cpm	600 cpm	1400 cpm
80-column card punching	100 cpm	100 cpm	100 cpm
96-column card reading	300 cpm	500 cpm	500 cpm
96-column card punching	60 cpm	120 cpm	120 cpm
Printing (standard character sets)	300 lpm	750 lpm	1040 lpm
Magnetic tape I/O	10 KB	36 KB	50 KC
MICR document input	None	900 dpm	1625 dpm
AVAILABILITY OF PERIPHERALS			
Disk Cartridge Drives	Yes	Yes	Yes
Dual Disk Pack Drive	No	No	Yes
Head-per-Track Memory Banks	No	No	Yes
Single-Line Communications Control	No	Yes	Yes

The only indication of processor performance that Burroughs has released to date is a statement that the three B 1700 models will deliver internal processing speeds ranging from 1.15 to 5 times that of the IBM System/3 in typical applications. These speeds, coupled with the other attractive features of the B 1700 Systems, would place them at or near the top of their class in the price/performance derby. Unfortunately, DATAPRO 70 can neither verify nor dispute the Burroughs performance claims because at this writing Burroughs has chosen not to reveal any detailed information about the B 1700 processor architecture or instruction timings.

Technologically, the B 1700 systems are in tune with the times. They use medium-scale integration (MSI) circuits with processor cycling rates of up to 6 million cycles per second and MOS main memories with read cycle times as low as 667 nanoseconds per 24-bit access. The high-speed Control Memory, used only in the B 1726 Processor, provides 2K or 4K bytes of bipolar storage for the most frequently used portions of the microprograms. (In the slower B 1712 and B 1714 Processors, the microprograms reside in main memory.)

A magnetic tape cassette reader, housed in the console of the processor, is used for initial loading of the systems software. The cassette reader is also used to load diagnostic routines which aid Burroughs field engineers in

Devices which require Type A controls in B 1726 systems are the 9340 Console Printer, all 80-column card readers, and the 9240 series line printers. Type B controls are required by the 80-column card punch, all 96-column card units, the 9247-3 Printer, and all MICR reader-sorters. Type C controls are required by the 9480 and 9481 Disk Cartridge subsystems. Type D controls are required by all magnetic tape subsystems. Type E controls are required by the head-per-track and disk pack subsystems and the data communications controls.

MASS STORAGE

9480/9481 DISK CARTRIDGE MEMORY SUBSYSTEMS: Provide low-cost random-access data storage on removable single-disk cartridges. Four models are available:

9480-1: single drive, stores 2,338,560 bytes.
9480-2: dual drives, stores 4,667,120 bytes total.
9481-1: single drive, stores 4,667,120 bytes.
9481-2: dual drives, stores 9,354,240 bytes total.

Each drive accommodates one disk cartridge and has two read/write heads, one serving each recording surface. The disk cartridge is 15 inches in diameter, 1.5 inches high, and weighs 5 pounds. In the dual-drive units, the two drives are "stacked" so that the unit occupies less than 5 square feet of floor space. In all four models, data is recorded in 180-byte segments, average head positioning time is 60 milliseconds, average rotational delay is 20 milliseconds, and data transfer rate is 193,000 bytes/second.

The 9480/9481 Disk Cartridge Memory Subsystems can be used with all three B 1700 Series processor models. A 9480 subsystem consists of a 1480 control and one or two 9480-1 or 9480-2 drive units, providing from 1 to 4 spindles and storing from 2.3 to 9.2 million bytes on-line. A 9481 subsystem consists of a 1481 control and one or two 9481-1 or 9481-2 drive units, providing from 1 to 4 spindles and storing from 4.6 to 18.4 million bytes on-line.

Burroughs B 1700

isolating malfunctioning circuit boards. A newly designed Maintenance Diagnostic Unit helps the field engineers to identify faulty components on the circuit boards. Moreover, the individual MSI circuit devices can readily be unplugged from the boards and replaced when failures occur.

The peripheral equipment for the B 1700 Systems, though far less innovative in design than the central processors, is broad in scope and attractively priced. Burroughs offers both 80-column and 96-column card I/O devices, and is placing principal emphasis upon a complete line of 96-column equipment that includes multipurpose on-line units plus off-line data recorders and sorters, all designed and built by Decision Data Corporation.

A family of low-cost, Caelus-built disk drives provides 2.3 or 4.6 million bytes of data storage on each single-disk cartridge. Larger-capacity disk drives and the time-tested Burroughs head-per-track disk files are available only with the B 1726 system. A compact 10KB magnetic tape unit is available for all three B 1700 systems, and the B 1714 and B 1726 can also make use of Burroughs' Magnetic Tape Clusters, which house two, three, or four tape drives and transfer data at 18KB or 36KB. Eight line printers offer speeds ranging from 90 to 1040 lpm and a choice of drum, chain, or train printing techniques. The banking field, where Burroughs is particularly strong, is served by new 600-dpm and 900-dpm MICR sorter-readers in addition to the earlier 1000-dpm and 1625-dpm models. No paper tape or optical reading equipment has been announced for the B 1700 Systems to date.

Data communications capabilities of the B 1700 Systems are quite limited at the present time. The B 1712 has no communications facilities. B 1714 and B 1726 systems are limited to single-line controls, which can control synchronous or asynchronous lines operating at a maximum of 9600 bps. Thus, a B 1700 System can be used effectively as a fairly high-powered remote terminal communicating with a larger central computer, but it cannot serve as the central element in a multi-line communications network. This is the area in which Burroughs has most obviously restricted the B 1700's current capabilities in order to preserve the marketability of the more costly B 2500, B 2700, and B 3500 systems, which offer effective multi-line communications facilities.

All software support for the B 1700 systems is built around the MCP, the integrated operating system that complements the hardware to create an unusually effective environment for multiprogrammed operation in any B 1700 system with at least 24K bytes of main memory. (A smaller version of the MCP without multiprogramming, MICR, or communications capabilities is available for use on 16K systems.) Like the MCP's for the larger Burroughs computers, the B 1700 MCP promises to be truly user-oriented and much easier to understand and use than

9486-2 DUAL DISK PACK DRIVE: Usable only in B 1726 systems, this unit provides a total of 95.5 million bytes of formatted data storage on two removable 11-disk packs. A 1486 Disk Pack Control and a single 9486-2 Dual Disk Pack Drive comprise a subsystem. Average head positioning time is 30 milliseconds, and average rotational delay is 12.5 milliseconds.

HEAD-PER-TRACK MEMORY BANKS: Usable only in B 1726 systems, these units provide rapid random access to up to 70 million bytes of data on nonremovable disk files with a fixed read/write head serving each track. Two models are available. The 9371-7 Memory Bank stores 7 million bytes with an average access time of 20 milliseconds; up to 4 additional 7-million-byte modules can be added for a maximum subsystem capacity of 35 million bytes. The 9371-14 Memory Bank stores 14 million bytes with an average access time of 40 milliseconds; up to 4 additional 14-million-byte modules can be added for a maximum subsystem capacity of 70 million bytes. A 1374 Disk File Control is required in each subsystem.

INPUT/OUTPUT UNITS

9491-2 MAGNETIC TAPE DRIVE: Reads and records data on 1/2-inch tape in the IBM-compatible 9-track NRZI mode at 800 bpi. Tape speed is 12.5 inches/second, data transfer rate is 10,000 bytes/second, and rewind speed is 50 inches/second. Standard vertical and horizontal parity checking are performed. The compact, table-top units accommodate 7-inch reels which hold 600 feet of tape. An optional stand/cabinet supports two of the tape drives and provides storage space for tape reels underneath. A 9491-2 tape subsystem, usable with all three of the B 1700 Series processor models, consists of a 1491 Magnetic Tape Control and from one to four 9491-2 drives.

9381 MAGNETIC TAPE CLUSTERS: Contain two, three, or four tape drives in a single compact cabinet. The feed and take-up reels for each tape drive are mounted on concentric vertical shafts, with the feed reel directly above the take-up reel. Pinch rollers and short vacuum-column buffers are employed. Each of the tape drives has its own drive mechanism, but they share a common power supply and read/write circuitry. The following six models are available for use in B 1714 or B 1726 systems only:

9381-12: 2 drives, 18,000 bytes/sec.
9381-13: 3 drives, 18,000 bytes/sec.
9381-14: 4 drives, 18,000 bytes/sec.
9381-22: 2 drives, 36,000 bytes/sec.
9381-23: 3 drives, 36,000 bytes/sec.
9381-24: 4 drives, 36,000 bytes/sec.

All models read and record on 1/2-inch tape in the IBM-compatible 9-track NRZI mode at 800 bpi. Tape speed is 22.5 inches/second in the 18KB models and 45 inches/second in the 36KB models. A tape cluster subsystem consists of a 1381 Magnetic Tape Cluster Control and one 9381 Cluster with two, three, or four drives.

9390-3 MAGNETIC TAPE DRIVE: Reads and records data on 1/2-inch tape in IBM-compatible 7-track NRZI mode at 200 or 556 bpi. Tape speed is 90 inches/second, yielding a data transfer rate of 18,000 char/second at 200 bpi or 50,000 char/second at 556 bpi. Up to six 9390-3 drives can be connected to a 1390-3 Magnetic Tape Control, which in turn can be used only with a B 1726 system.

9115/9116 CARD READER: Reads standard 80-column cards photoelectrically at a demand rate of 300 cpm (9115) or 600 cpm (9116). Includes a 1000-card input hopper and one 1000-card stacker. Fits on a tabletop, where it occupies less than 3 square feet of space. An operator-changeable option permits either 51-column or 80-column cards to be read. The 300-cpm model is usable with any B 1700 Series system, and the 600-cpm model is usable only with B 1714 and B 1726 systems.

Burroughs B 1700

This medium-sized B 1700 System is equipped with two of Burroughs' new, low-cost 10KB magnetic tape drives (far left) and a pair of dual disk cartridge drives.

most of the competitive operating systems. The MCP receives its orders through straightforward messages entered via the console keyboard or control cards.

Burroughs expects the B 1700, like the large-scale 700 Series systems, to be programmed exclusively in higher-level languages. Compilers are available for the COBOL, RPG, FORTRAN, and BASIC languages. Associated with each compiler is an Interpreter—a specialized microprogram that is used at execution time to interpret and execute the code generated by the compiler. The B 1700 microprogramming itself—which presents all sorts of fascinating possibilities for systems engineers and software designers—is "not user-accessible at the moment", according to Burroughs.

Burroughs is placing strong marketing emphasis upon its library of Business Management Systems. These are well-designed groups of related application programs that should significantly reduce the cost and time required to get a B 1700 system into productive operation for many users in manufacturing, wholesaling, distribution, banking, and hospitals. In addition, Burroughs will, for a fee, provide all the support required to install and maintain a system.

Until Burroughs announces its emulation plans, program compatibility with computers other than Burroughs' own B 300 Series will be achieved via higher-level languages. The B 1700 COBOL and FORTRAN compilers conform with the American National Standards for these languages. Programs written in RPG or RPG II for IBM computers can either be compiled by the B 1700 RPG compiler or translated into COBOL by the COFIRS (COBOL From IBM RPG Specifications) routine.

Data compatibility with most computer systems can be achieved via punched cards (80- or 96-column) or magne-

9111/9112 CARD READER: Reads standard 80-column cards serially by column, on demand, at up to 800 cpm (9111) or 1400 cpm (9114). The feed hopper and stacker hold up to 2400 cards each and can be loaded and unloaded while the reader is operating. Usable only with B 1726 systems.

9210 CARD PUNCH: Punches and read-checks standard 80-column cards at 100 cpm. The feed hopper and single stacker hold 800 cards each. Usable with any B 1700 Series system.

9119-1 CARD READER: Reads 96-column cards at 300 cpm. Includes a 600-card input hopper and one 600-card stacker. Fits on a tabletop, where it occupies less than 1.5 square feet. Usable with any B 1700 Series system.

9319-2 CARD READER PUNCH: Reads 96-column cards at 300 cpm, and punches and/or prints full cards at 60 cpm; higher punching speeds are possible if fewer columns are punched. The single card feed path includes: 600-card primary input hopper, 400-card secondary input hopper, read station, visible wait station, punch station, punch check station, print station, and two 400-card stackers. The print station permits printed interpretation of the punched data at 60 cpm, with three 32-character lines per card. Input and output data is buffered. Usable with any B 1700 Series system.

9419-2 CARD READER PUNCH/DATA RECORDER: Provides the same 300-cpm reading, 60-cpm punching, and 60-cpm printing facilities as the 9319-2 Card Reader Punch described above, plus a keyboard that permits off-line use as a 96-column keypunch or verifier. Includes program storage for four format-control programs. Usable with any B 1700 Series system.

9419-6 MULTI-PURPOSE CARD UNIT: Provides the same 300-cpm reading, 60-cpm punching, and 60-cpm printing facilities and data recorder keyboard as the 9419-2 Card Reader Punch/Data Recorder described above, plus the ability to sort cards into any of six 400-card stackers under program control at 300 cpm. Can be used off-line for sorting, keypunching, or verifying. Numeric sorting requires 1.5 passes per card column, while alphabetic sorting requires 2.5 passes per card column. Usable with any B 1700 Series system.

9319-4 HIGH-SPEED READER PUNCH: Reads 96-column cards at 500 cpm, and punches and/or prints at 120 cpm. The single card feed path includes: one 2000-card input

tic tape files, but the disk cartridges and disk packs used in Burroughs drives are not format-compatible with the ones used in competitive systems.

The B 1700 Systems effectively plug the sizeable product-line gap that previously existed between the Burroughs L Series accounting computers and the considerably larger B 2500 and B 2700 systems. Thus, they will surely prevent many current Burroughs users from moving to competitive systems (most commonly the IBM System/3) when they outgrow their L Series machines.

In competitive situations, the B 1700 Systems will generally be up against the IBM System/3 Model 10 and the smaller models of the Honeywell Series 200, NCR Century Series, and UNIVAC 9000 Series computer families. Within this class, the B 1700 Systems rank at the top in technology, flexibility, and—probably—raw performance per dollar. For many prospective users, the cost of converting to a B 1700 System is likely to fall dramatically when the appropriate emulation features become available. When Burroughs demonstrates in users' installations the veracity of its claims about their performance and ease of use, the B 1700 Systems could well shape up as a clear-cut "best buy" for most small-scale data processing installations—and could have a major impact upon the nature and timing of forthcoming product announcements from Burroughs' competitors. □

hopper, read station, punch wait station, punch station, punch check station, print wait station, print station, stacker turn station, and three 1200-card stackers. The print station permits printed interpretation of the punched cards at 120 cpm, with four 32-character lines per card. Input and output data is buffered. Usable only with B 1714 and B 1726 systems.

96-COLUMN CARD DATA RECORDER: An off-line unit for keypunching, verifying, interpreting, reproducing, gang-punching, and interfiling 96-column cards. Available in printing and non-printing models. Rated speed is 60 cpm for punching, verifying, or interpreting and 45 cpm for reproducing. Features include buffered punching, four operator-selectable programs, two input hoppers, two output stackers, automatic right justification, printing during verification, illuminated column indicator, and movable keyboard.

96-COLUMN CARD ALPHANUMERIC SORTER: An off-line unit that sorts 96-column cards into 11 stackers at 1500 cpm. The input hopper holds 2000 cards, and each of the 11 stackers holds 1200 cards. Numeric fields can be sorted in 1 pass per card column, while alphabetic fields require 1-2/3 passes per column.

LINE PRINTERS: Burroughs offers eight printers, spanning a range of printing speeds from 90 to 1040 lpm, for the B 1700 systems. All models have 132 print positions. Their rated speeds, printing techniques, and the processor models with which they can be used are as follows:

- 9249-1: 90-lpm Chain Printer (for B 1712 and B 1714).
- 9249-2: 180-lpm Chain Printer (for B 1712 and B 1714).
- 9245-16: 300-lpm Drum Printer (for B 1712 and B 1714).
- 9245-19: 400-lpm Drum Printer (for B 1714 only).
- 9240-1: 475-lpm Drum Printer (for B 1714 and B 1726).
- 9240-2: 700-lpm Drum Printer (for B 1714 and B 1726).
- 9240-3: 1040-lpm Drum Printer (for B 1726 only).
- 9247-3: 750-lpm Train Printer (for B 1714 and B 1726).

The new 9247-3 Train Printer achieves its rated 750-lpm speed with the standard 48-character set. It can be equipped with other interchangeable train modules containing 16, 64, or 96 printable characters and yielding speeds of 1200, 610, or 440 lpm, respectively. The 96-character set contains both upper and lower-case alphabetics. The 9247-3 handles vertical format control through either the Burroughs Forms-Self-Align system, which uses codes preprinted on the forms, or an optional 12-channel carriage control tape.

9340 CONSOLE PRINTER: This unit, required in every B 1700 system, is the primary interface between the operator and the Master Control Program. It provides keyboard input and low-speed printed output.

MICR READER-SORTERS: Burroughs offers six MICR reader-sorters for use with the B 1714 and/or B 1726 systems, including the new, low-cost 9135/9136 series:

- 9136-5: 600 dpm, 8 pockets (for B 1714 and B 1726).
- 9136-6: 600 dpm, 12 pockets (for B 1714 and B 1726).
- 9135-8: 900 dpm, 8 pockets (for B 1714 only).
- 9135-12: 900 dpm, 12 pockets (for B 1714 only).
- 9131-1: 1000 dpm, 13 pockets (for B 1726 only).
- 9134-1: 1625 dpm, 4, 8, 12, or 16 pockets (for B 1726 only).

COMMUNICATIONS CONTROL

1351 SINGLE-LINE CONTROL: Provides the interface between a single leased or switched communications line and a B 1714 or B 1726 Processor; not usable with the B 1712 Processor. A maximum of two 1351 Controls can be used in a B 1714 system. Each control must be equipped with an appropriate line adapter. Ten different line adapters permit communication with Teletype terminals and with the full range of Burroughs computers and terminal equipment. Transmission speeds up to 9600 bits/second can be handled in either asynchronous or synchronous mode.

SOFTWARE

MASTER CONTROL PROGRAM: The central component of Burroughs software support for the B 1700 is the MCP, a modular operating system that manages and controls all operations of the system. The B 1700 MCP is available in two versions, MCP I for entry-level systems and MCP II for larger systems.

MCP II runs on any B 1700 Series processor equipped with at least 24K bytes of main memory, console printer, disk drive, card reader, and line printer. It performs the following principal functions: (1) schedules the loading and execution of user programs in a multiprogramming environment, in accordance with user-assigned priorities; (2) allocates memory areas, processor logic, and peripheral units; (3) schedules and initiates all I/O operations; (4) provides automatic error-handling procedures; (5) creates and maintains a disk program library; (6) handles communication between the system and its operator via the console typewriter and control cards; (7) provides a printout showing the status of all active jobs upon request; (8) guides the compilation of programs written in COBOL, FORTRAN, BASIC, and RPG; (9) handles file opening and closing, physical data management, utility functions, program loading, and program library calls; and (10) controls data communications devices and MICR reader-sorters.

Burroughs B 1700

➤ Burroughs hopes to restrict the main memory residence requirement for MCP II to 8K bytes.

MCP I runs on any B 1700 Series processor equipped with at least 16K bytes of main memory, console printer, dual disk cartridge drive, line printer, and 96-column card reader. It performs most of the functions of MCP II but lacks the ability to control multiprogramming, data communications, or MICR reader-sorter operations. Under MCP I, programs are executed sequentially in batch mode. All programs created under MCP I can be run without change under MCP II control. Burroughs hopes to restrict the main memory residence requirement for MCP I to 4K bytes.

COBOL: The B 1700 COBOL language is compatible with American National Standard COBOL and includes certain Burroughs extensions. COBOL object programs are regarded as a collection of logical segments which can be loaded and executed individually or in groups, meaning that programs can be written without the usual limitations imposed by the computer's memory capacity. The COBOL compiler runs on any B 1700 processor with at least 16K bytes of main memory, console printer, disk drive, line printer, and card reader. The COBOL Interpreter, required at execution time, occupies 4K bytes of main memory in addition to the object program's requirements.

REPORT PROGRAM GENERATOR: The B 1700 RPG Compiler converts source programs written in the widely used RPG language into object programs that can be executed by B 1700 systems. Burroughs states that the compiler will permit programs written in IBM RPG or RPG II, or in most other versions of the RPG language, to be compiled and run with little or no change. RPG programs are automatically segmented during compilation, so programs can be written without the usual limitations imposed by the computer's memory capacity. The RPG Compiler runs on any B 1700 processor with at least 16K bytes of main memory, console printer, disk drive, line printer, and card reader. The RPG Interpreter–which is actually the same interpreter used for COBOL object programs–occupies 4K bytes of main memory at execution time in addition to the object program's requirements.

FORTRAN: The B 1700 FORTRAN language is compatible with American National Standard FORTRAN and includes certain Burroughs extensions. It is compatible with IBM FORTRAN IV Level H. The FORTRAN compiler runs on any B 1700 processor with at least 16K bytes of main memory, console printer, disk drive, line printer, and card reader. The FORTRAN Interpreter, required at execution time, occupies 4K bytes of main memory in addition to the object program's requirements.

BASIC: The B 1700 BASIC compiler will accept source programs written in a language that generally corresponds to the original Dartmouth BASIC (Beginners' All-purpose Symbolic Instruction Code). The batch-mode compiler runs on any B 1700 processor with at least 16K bytes of main memory, console printer, disk drive, line printer, and card reader. At a later date, Burroughs plans to deliver a BASIC compiler that permits interactive, conversational problem-solving.

UTILITY ROUTINES: A typical complement of sort, merge, edit, I/O control, data transcription, library maintenance, diagnostic, and conversion routines will be provided for the B 1700 systems. Most of these routines, in fact, are integral functions of the Master Control Program.

APPLICATION PROGRAMS: Burroughs offers a library of Business Management Systems, which provide operational control through comprehensive management reports. Currently available are the:

Wholesale Management System
Distributor Management System
Manufacturing Management System
Bank Management System
Hospital Management System

PRICING

EQUIPMENT: The following systems are representative of the types of B 1700 systems that are likely to be commonly installed and are supported by the standard Burroughs software. All necessary control units are included in the indicated prices. The quoted rental prices are for the basic one-year lease and include equipment maintenance.

ENTRY-LEVEL B 1712 SYSTEM: Consists of 16K B 1712 Processor, console printer, 96-column card reader punch/data recorder (reads 300 cpm, punches 60 cpm), 180-lpm printer with 132 print positions, and dual disk cartridge drives (4.6 million bytes). Monthly rental and purchase prices are $1,755 and $73,505, respectively.

TYPICAL B 1714 SYSTEM: Consists of 24K B 1714 Processor, console printer, 96-column card reader punch/data recorder (reads 300 cpm, punches 60 cpm), 300-lpm printer with 132 print positions, and three disk cartridge drives (6.9 million bytes). Monthly rental and purchase prices are $2,580 and $104,705, respectively.

TYPICAL B 1726 SYSTEM: Consists of 48K B 1726 Processor with 2K bytes of Control Memory, console printer, 96-column card reader punch (reads 500 cpm, punches 120 cpm), 700-lpm printer with 132 print positions, and six disk cartridge drives (27.6 million bytes). Monthly rental and purchase prices are $4,795 and $219,540, respectively.

SOFTWARE: The appropriate Master Control Program, sort package, and utility routines are provided to all B 1700 users at no additional cost. The compilers are offered at the following monthly license fees: COBOL–$50, RPG–$50, FORTRAN–$100, and BASIC–$70. All applications software is separately priced under Burroughs' Program Products plan. The Program Products are offered under either an Unlimited-Time License Plan, for a one-time charge followed by an annual maintenance fee, or a Limited-Time License Plan, with monthly payments during either a 3-year or 5-year lease term. The available Program Products and their associated license fees are listed under "Software Prices" at the end of this report.

TECHNICAL SUPPORT: B 1700 users can purchase Burroughs technical assistance in three ways: (1) as part of a Business Management System (see "Software Prices"); (2) under a Systems Analyst Assistance Agreement, for $2,000 per year; or (3) on a per-diem basis, when available, for $150 per day.

EDUCATION: B 1700 users can obtain the necessary training: (1) as part of a Business Management System (see "Software Prices"); or (2) by paying for individual courses. The 10 separately priced courses announced to date range from 3 to 8 days in length and cost $40 per day for each attendee.

CONTRACT TERMS: The standard equipment lease agreement includes equipment maintenance and entitles the customer to unlimited use of the equipment. The standard agreement covers maintenance of the equipment for eight consecutive hours a day, Monday through Friday. (No 176-hour nor Measured Time Usage lease plans are available for the B 1700 systems.)

In addition to the standard 1-year lease, Burroughs offers 3-year and 5-year leases at prices 5 and 10 percent lower, respectively, than the 1-year lease prices shown in the equipment price list.

For purchased systems, Burroughs offers a new Extended Payment Plan that allows the payments to be spread over three or five years at 8% simple interest or (for systems costing more than $150,000) over six years at 9% simple interest. ■

datapro 70

Burroughs B 1700

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
PROCESSORS AND MAIN STORAGE				
B 1712	Processor with 16K bytes of memory	27,225	90	560
Memory Options for B 1712 Processor:				
B 1012-24	24K Bytes Total Memory	5,000	10	150
B 1012-32	32K Bytes Total Memory	12,000	16	400
B 1012-40	40K Bytes Total Memory	17,000	27	550
B 1714	Processor with 16K bytes of memory	34,225	95	780
Memory Options for B 1714 Processor:				
B 1014-24	24K Bytes Total Memory	5,000	13	150
B 1014-32	32K Bytes Total Memory	11,000	18	350
B 1014-40	40K Bytes Total Memory	20,000	25	550
B 1014-49	49K Bytes Total Memory	26,000	36	700
B 1014-57	57K Bytes Total Memory	32,000	48	850
B 1014-65	65K Bytes Total Memory	38,000	61	1,000
B 1726	Processor with 24K bytes of main memory and 2K bytes of Control Memory	78,300	140	1,740
Memory Options for B 1726 Processor:				
B 1026-32	32K Bytes Total Memory	5,400	10	85
B 1026-40	40K Bytes Total Memory	10,800	16	205
B 1026-49	49K Bytes Total Memory	16,200	22	325
B 1026-57	57K Bytes Total Memory	21,600	28	460
B 1026-65	65K Bytes Total Memory	27,000	35	610
B 1026-81	81K Bytes Total Memory	42,190	47	935
B 1026-98	98K Bytes Total Memory	57,380	60	1,285
A/B 1305	I/O Expansion Feature	1,500	5	30
A/B 9340	Console Printer	2,640	15	55
A 1340	Console Printer Control (for B 1712 / 1714)	1,800	5	60
B 1340	Console Printer Control (for B 1726)	2,230	5	60
B 1026-2	2,048 Bytes Additional Control Memory (for B 1726)	9,600	30	400
B 1097-3	Console Corner Table (for B 1726)	720	0	15
MASS STORAGE				
A/B 9480-1	Single Disk Cartridge Drive; 2.3 million bytes	10,000	31	250
A/B 9480-2	Dual Disk Cartridge Drive; 4.6 million bytes	15,450	53	365
A/B 9481-1	Single Disk Cartridge Drive; 4.6 million bytes	13,200	47	310
A/B 9481-2	Dual Disk Cartridge Drive; 9.2 million bytes	21,600	72	480
A 1480	Control for 9480-1 & 9480-2 Drives (B 1712/1714)	2,700	14	90
B 1480	Control for 9480-1 & 9480-2 Drives (B 1726)	4,320	15	90
A 1481	Control for 9481-1 & 9481-2 Drives (B 1712 & 1714)	3,500	15	100
B 1481	Control for 9481-1 & 9481-2 Drives (B 1726)	4,320	15	90
A/B 9985-2	Disk Cartridge for 9480-1 & 9480-2 Drives	170	–	–
A/B 9985-3	Disk Cartridge for 9481-1 & 9481-2 Drives	225	–	–
B 9486-2	Dual Disk Pack Drive; 95.5 million bytes	45,600	123	950
B 1486	Control for B 9486-2 Drive (B 1726)	44,160	143	920
B 9974-1	Disk Pack for B 9486-2 Drive	575	–	25
B 9371-7	Head-per-Track Memory Bank; 7 million bytes	28,800	215	600
B 9371-14	Head-per-Track Memory Bank; 14 million bytes	36,000	210	750
B 9374-17	7-Million-Byte Add-On Unit for B 9371-7	19,200	94	400
B 9374-10	14-Million-Byte Add-On Unit for B 9371-14	26,400	115	550
B 1374	Control for Head-per-Track Memory Banks (B 1726)	9,600	12	200
MAGNETIC TAPE EQUIPMENT				
A/B 9381-12	Magnetic Tape Cluster; 18KB, 2 stations	25,200	179	525
A/B 9381-13	Magnetic Tape Cluster; 18KB, 3 stations	26,960	200	570
A/B 9381-14	Magnetic Tape Cluster; 18KB, 4 stations	32,160	241	680
A/B 9381-22	Magnetic Tape Cluster; 36KB, 2 stations	33,600	205	700
A/B 9381-23	Magnetic Tape Cluster; 36KB, 3 stations	43,200	236	900
A/B 9381-24	Magnetic Tape Cluster; 36KB, 4 stations	52,800	267	1,100
A 1381	Magnetic Tape Cluster Control (B 1714)	6,000	38	250
B 1381	Magnetic Tape Cluster Control (B 1726)	6,960	38	250
B 9390-3	Magnetic Tape Unit; 18/50KC, 7 tracks	15,860	149	330
B 1390	18/50KC 7-Track Tape Control (B 1726)	6,960	38	250
A/B 9491-2	Magnetic Tape Unit; 10KB, 9 tracks	8,600	21	215
A 1491-2	10KB Tape Control (B 1712 & 1714)	3,900	30	200
B 1491	10KB Tape Control (B 1726)	9,600	30	200

* Rental prices include equipment maintenance.

Note: Peripherals and controls with prefix "A" are used with B 1712 and/or B 1714 systems, while those with prefix "B" are used with B 1726 systems.

Burroughs B 1700

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
MAGNETIC TAPE EQUIPMENT (cont)				
80-COLUMN CARD EQUIPMENT				
B 9111	Card Reader; 800 cpm	16,250	85	325
B 9112	Card Reader; 1400 cpm	21,600	129	450
A/B 9115	Card Reader; 300 cpm	4,500	25	110
A/B 9116	Card Reader; 600 cpm	6,500	35	195
A 1115	Control for A 9115 Reader (B 1712 & 1714)	900	7	45
A 1116	Control for A 9116 Reader (B 1714)	1,200	8	55
B 1111	Control for B 9111 & 9112 Readers (B 1726)	2,160	7	45
B 1115	Control for B 9115 & 9116 Readers (B 1726)	2,160	8	45
B 9917	Card Counter (for B 9111 & 9112)	240	–	5
B 9918	Postal Money Order Feature (for B 9111 & 9112)	1,440	5	30
B 9919	40-Column Read Switch (for B 9111 & (112)	190	–	–
A/B 9210-1	Card Punch; 100 cpm	18,425	67	315
A 1210-1	Control for A 9210-1 Punch (B 1712 & 1714)	4,320	14	90
B 1210	Control for B 9210-1 Punch (B 1726)	4,320	14	90
96-COLUMN CARD EQUIPMENT				
A/B 9119-1	Card Reader; 300 cpm	3,500	25	85
A/B 9319-2	Card Reader Punch; reads 300 cpm, punches 60 cpm	7,990	60	200
A/B 9319-4	Card Reader Punch; reads 500 cpm, punches 120 cpm	11,190	91	310
A/B 9419-2	Card Reader Punch/Data Recorder; reads 300 cpm, punches 60 cpm	9,490	71	240
A/B 9419-6	Multi-Purpose Card Unit; reads 300 cpm, punches 60 cpm, sorts 300 cpm	11,390	85	285
A 1119-1	Control for A 9119-1 (B 1712 & 1714)	900	7	45
B 1119	Control for B 9119-1 (B 1726)	2,160	7	45
A 1319-2	Control for A 9319-2 (B 1712 & 1714)	1,900	10	65
A 1319-4	Control for A 9319-4 (B 1714)	2,300	11	70
B 1319	Control for B 9319-2 & 9319-4 (B 1726)	3,360	11	70
A 1419-2	Control for A 9419-2 (B 1712 & 1714)	1,900	10	65
A 1419-6	Control for A 9419-6 (B 1712 & 1714)	2,100	11	70
B 1419	Control for B 9419-2 & 9419-6 (B 1726)	2,160	11	70
LINE PRINTERS				
A/B 9240-1	Printer; 475 lpm, 132 positions	19,500	174	475
A/B 9240-2	Printer; 700 lpm, 132 positions	31,000	179	625
A 9245-16	Printer; 300 lpm, 132 positions	20,000	149	475
A 9245-19	Printer; 400 lpm, 132 positions	23,000	154	575
A/B 9247-3	Printer; 750 lpm, 132 positions	35,000	148	750
A 9249-1	Printer; 90 lpm, 132 positions	8,500	60	240
A 9249-2	Printer; 180 lpm, 132 positions	11,200	70	280
B 9240-3	Printer; 1040 lpm, 132 positions	43,500	195	900
A 1240-1	Control for A 9240-1 (B 1714)	1,400	9	50
A 1240-2	Control for A 9240-2 (B 1714)	1,500	11	70
A 1245-16	Control for A 9245-16 (B 1712 & 1714)	1,400	8	50
A 1245-19	Control for A 9245-19 (B 1714)	1,500	11	70
A 1247-3	Control for A 9247-3 (B 1714)	2,800	44	215
A 1249-1	Control for A 9249-1 (B 1712 & 1714)	1,000	5	35
A 1249-2	Control for A 9249-2 (B 1712 & 1714)	1,100	6	40
B 1240	Control for B 9240-1, -2, or -3 (B 1726)	2,880	9	60
B 1247	Control for B 9247-3 (B 1726)	4,320	14	90
MICR READER-SORTERS				
A 9135-8	Reader-Sorter; 900 dpm, 8 pockets	45,500	431	1,000
A 9135-12	Reader-Sorter; 900 dpm, 12 pockets	55,900	467	1,300
A/B 9136-5	Reader-Sorter; 600 dpm, 8 pockets	34,000	225	700
A/B 9136-6	Reader-Sorter; 600 dpm, 12 pockets	39,000	270	850
B 9131-1	Reader-Sorter; 1000 dpm, 13 pockets	57,600	461	1,200
B 9134-1	Reader-Sorter; 1625 dpm, 4 pockets (requires Feature B 9938-1)	49,200	333	1,025
A 1135	Control for A 9135-8 & 9135-12 (B 1714)	6,000	30	150
A 1136	Control for A 9136-5 & 9136-6 (B 1714)	6,000	30	150
B 1131	Control for B 9131-1 (B 1726)	6,480	23	150
B 9932	Endorser (for B 9131-1)	9,000	50	200
B 1134	Control for B 9134-1 (B 1726)	6,480	30	200
B 9932-1	Endorser (for B 9134-1)	9,000	51	200

* Rental prices include equipment maintenance.

Note: Peripherals and controls with prefix "A" are used with B 1712 and/or B 1714 systems, while those with prefix "B" are used with B 1726 systems.

datapro 70

Burroughs B 1700

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
MICR READER-SORTERS (cont)				
B 9933-4	Extended Sort Control (for B 9134-1)	2,400	15	50
B 9935-2	Four-Pocket Module (for B 9134-1)	14,400	36	300
B 9938-1	Multi-Track E-13B Read (for B 9134-1)	18,000	56	375
COMMUNICATIONS CONTROLS				
A/B 1351	Single-Line Control	2,000	8	50
Data Communications Line Adapters:				
A/B 1650-1	Asynchronous Data Set Connect, up to 1200 bps	1,500	8	50
A/B 1650-2	Asynchronous Data Set Connect, up to 1800 bps	1,800	10	65
A/B 1650-5	Asynchronous Direct-Connect, up to 2400 bps	1,500	8	50
A/B 1650-6	Asynchronous Direct-Connect, up to 4800 bps	1,800	10	65
A/B 1650-7	Asynchronous Direct-Connect, up to 9600 bps	2,100	12	80
A/B 1651-1	Synchronous Data Set Connect, up to 2400 bps	1,500	8	50
A/B 1651-2	Synchronous Data Set Connect, up to 4800 bps	1,800	10	65
A/B 1651-3	Synchronous Data Set Connect, up to 9600 bps	2,100	12	80
A/B 1652-1	Asynchronous Data Set Connect for Teletypewriters	1,500	8	50
A/B 1652-5	Asynchronous Data Set Connect for Teletypewriters	1,500	8	50

SOFTWARE PRICES

		UNLIMITED-TIME PLAN			LIMITED-TIME PLANS	
		Single Payment	12 Monthly Payments	Annual Maint. Charge	Monthly Fee (3-Year Plan)	Monthly Fee (5-Year Plan)
BUSINESS MANAGEMENT SYSTEM						
B01	Business Management System (Accounts Receivable, Accounts Payable, Payroll, General Ledger)	7,100	650	360	NA	NA
B02	Business Management System**	9,500	857	360	NA	NA
R01	Invoicing, Accounts Receivable, Inventory	3,200	290	160	NA	NA
R02	Invoicing, Accounts Receivable, Inventory**	4,470	400	160	NA	NA
A01	Accounts Payable	1,400	128	70	NA	NA
A02	Accounts Payable**	2,445	224	70	NA	NA
P01	Payroll	1,800	165	90	NA	NA
P02	Payroll**	2,790	255	90	NA	NA
G01	General Ledger	1,400	128	70	NA	NA
G02	General Ledger**	2,445	224	70	NA	NA
BANK MANAGEMENT SYSTEM						
F01	Bank Management System (DDA, Savings, Installment Loans, Certificate of Deposit, Proof and Transit, General Ledger)	6,900	630	345	NA	NA
F02	Bank Management System**	9,475	870	345	NA	NA
D01	Demand Deposit Accounting	2,500	230	125	NA	NA
D02	Demand Deposit Accounting**	3,565	325	180	NA	NA
T01	Proof and Transit	1,000	90	50	NA	NA
T02	Proof and Transit**	2,095	190	105	NA	NA
S01	Savings	1,500	140	75	NA	NA
S02	Savings**	2,400	220	120	NA	NA
I01	Installment Loans	1,000	90	50	NA	NA
I02	Installment Loans**	2,130	195	110	NA	NA
C01	Certificate of Deposit	750	70	35	NA	NA
C02	Certificate of Deposit**	1,570	145	80	NA	NA
L01	General Ledger	500	45	25	NA	NA
L02	General Ledger**	1,510	140	75	NA	NA
INDUSTRIAL MANAGEMENT SYSTEM						
NCS	APT Level III (B 1726 only)	6,300	580	150	150	144
PCE	Engineering Data Control (B 1726 only)	4,500	415	100	100	96
PCR	Requirements Planning (B 1726 only)	4,500	415	100	100	96
PCI	Inventory (B 1726 only)	4,500	415	100	100	96
PCW	Work-In-Process (B 1726 only)	6,000	550	140	140	135
HOSPITAL MANAGEMENT SYSTEM						
HSA	Patient Accounting	4,400	405	100	100	96
HSG	General Ledger	2,200	200	50	50	48
HSR	Medical Records	2,200	200	50	50	48
HSP	Payroll	2,200	200	50	50	48

* Rental prices include equipment maintenance.

**These versions include hardware-software training, application training, and a Systems Analyst Assistance Agreement (on-going technical support) for the first year (renewable at $2,000/year).