Burroughs B 1700 Series

MANAGEMENT SUMMARY

The Burroughs B 1700 Series computers, unveiled in June 1972, constitute 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, the B 1700 systems more clearly deserve to be called "fourth generation" computers than any others introduced to date. Burroughs has managed to incorporate, into systems which rent for just $1,500 to $12,500 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 five central processors—the B 1712, B 1714, B 1718, B 1726, and B 1728—and a broad array of peripheral equipment. Software support centers on the Master Control Program (MCP), 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, utilities, and hospitals. An unbundled pricing plan imposes separate charges for technical support, education, and all software except the MCP and utility routines.

The most innovative feature of the B 1700 systems is their "variable micrologic", an advanced form of ▷

The five B 1700 Series systems offer small-scale computer users a host of "fourth generation" features and span a wide price range of about $1,500 to $12,500 per month. Variable micrologic enables the B 1700 processors to adapt themselves dynamically to the characteristics of each programming language. User experience is confirming the effectiveness of the advanced B 1700 design concepts.

CHARACTERISTICS

MANUFACTURER: Burroughs Corporation, Burroughs Place, Detroit, Michigan 48232. Telephone (313) 972-7000.

MODELS: B 1712, B 1714, B 1718, B 1726, and B 1728 Data Processing Systems.

MAIN STORAGE

The B 1700 Series main memories are addressable to the bit level and utilize no preferred word or byte boundaries that are visible to the rest of the system. Variable instruction and operand lengths permit from 1 to 65,536 bits of data to be addressed with a single instruction, and up to 24 bits can be transferred in parallel between main memory and the processor. According to Burroughs, this feature yields a 20 to 40 percent reduction in memory requirements for typical programs.

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 1718–32,768 to 65,536 ▶
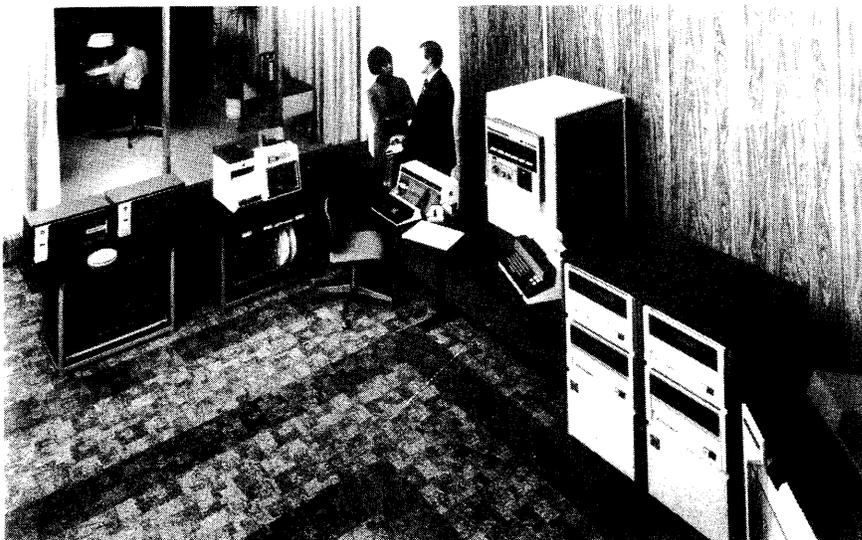
This medium-sized B 1700 system is equipped with two of Burroughs' low-cost 10KB magnetic tape drives (far left) and a pair of dual disk cartridge drives (at right).

Burroughs B 1700 Series

▷ microprogramming that alters the central processor's logical operations to suit the characteristics of each programming language. The central processors are "soft" machines whose logical structure is largely undefined 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, 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, when equipped with the appropriate microprograms, of executing programs written for virtually any other computer at a relatively high level of efficiency. But at this writing, only two emulator programs have been released: a Burroughs B 100/200/300/500 Emulator, introduced along with the B 1726 system in June 1972 and released for the B 1714 and B 1718 in September 1974, and an IBM 1401/1440/1460 Emulator, available for the B 1726 and B 1728. Other possible bets for future emulation are the Honeywell Series 200, NCR Century Series, UNIVAC 9000 Series, and the IBM 1130 system. Burroughs believes that the high degree of compatibility between the RPG compiler offered on the B 1700 system and the RPG and RPG II languages supplied for the IBM 360/20 and IBM System/3 obviates the need for additional emulation capabilities for these targeted systems.

The B 1700 architecture also forms an excellent basis for future expansion. As an example, the basic design could readily accommodate two or more central processors, but no multiple-processor B 1700 Series systems have been announced to date.

The B 1700 Series was introduced in June 1972 and expanded through the addition of the B 1728 Processor in July 1973 and the B 1718 Processor a year later. On the June 1972 announcement date, approximately 25 systems were already operating within the Burroughs organization. Customer deliveries of systems using the B 1712 and B 1714 systems began in the third quarter of 1972, while B 1726 and B 1728 deliveries began in the second and third quarters of 1973 respectively.

By October 1973, according to reliable industry sources, Burroughs had received more than 1000 orders for the B 1700 Series and had delivered more than 400 systems. Six months later, in April 1974, both the number of orders and the number of installed systems had nearly doubled, as the B 1700 established itself as a solid performer in small-scale data processing environments. As one might expect, the majority of systems installed to date utilize the smaller B 1712 and B 1714 Processors. ▷

▶ bytes in 8,192-byte increments; B 1726—24,576 to 131,072 bytes in 8,192-byte increments to 65K and 16,384-byte increments thereafter; B 1728—65,536 to 262,144 bytes in 16,384-byte increments.
CYCLE TIME: See table.

CHECKING: Parity bit associated with each byte (8 data bits) is generated during writing and checked during reading.

STORAGE PROTECTION: Main storage write operations are permitted only within the limits defined by a base register and a limit register.

CENTRAL PROCESSORS

The B 1700 Series processors feature dynamically variable microprogrammed logic and bit-addressable memories. The processors' logical functions are performed by a set of elementary operators called microinstructions, which operate on strings of bits. There are 28 defined microinstructions in the B 1712, B 1714, and B 1718 Processors, and 32 in the faster B 1726 and B 1728 Processors. All current microinstructions are 16 bits in length.

Burroughs defines S-language (Secondary-language) instructions as intermediate instructions which are equivalent to the machine-language instructions of conventional computers. Each S-language instruction is implemented by a string of microinstructions which interpretively execute the functions specified by the S-instruction. Because the S-instructions are software-defined by the microprograms, the functions they specify can be quite complex. In most cases, S-instructions specify an operation to be performed, one or more operand addresses, data field lengths, and units of data.

For each B 1700 programming language, Burroughs has defined an "ideal machine" and developed a specialized microprogram, called an Interpreter, that makes the B 1700 appear to be logically equivalent to that machine. The Interpreter executes the instructions which have been generated by the corresponding compiler. These compiler-generated instructions are expressed in an appropriate 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-instructions need to be executed to perform a given function as in typical machine-level computer programs.

Under MCP II control, it is possible for programs written in two or more languages to run concurrently in a multiprogramming mix. In this case, all of the corresponding Interpreters reside in main or control memory, and the B 1700 changes 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 five B 1700 Series processor models are program-compatible and generally similar in architecture, with one major exception. In the B 1712, B 1714, and B 1718 Processors, all microprograms reside in main memory along with the compiler-generated S code and user data. The faster B 1726 and B 1728 Processors include from 2,048 to 8,192 bytes of high-speed control memory that is used exclusively for microprogram storage. The control memory holds the most frequently used portions of the ▶

Burroughs B 1700 Series

CHARACTERISTICS OF THE B 1700 SYSTEMS

	B 1712	B 1714	B 1718	B 1726	B 1728
CENTRAL PROCESSORS					
Processor cycle time, nanoseconds	500	250	250	167	167
Maximum number of I/O controls	8	8	10	10	14
MAIN MEMORY					
Minimum capacity, bytes	16,384	16,384	32,768	24,576	65,536
Maximum capacity, bytes	40,960	65,536	65,536	131,072	262,144
Read cycle time, microseconds	2.0	1.0	1.0	0.667	0.667
Write cycle time, microseconds	3.0	1.5	1.5	1.0	1.0
Bits fetched per cycle	Up to 24	Up to 24	Up to 24	Up to 24	Up to 24
CONTROL MEMORY					
Minimum capacity, bytes	None	None	None	2,048	6,144
Maximum capacity, bytes	None	None	None	4,096	8,192
Read cycle time, nanoseconds	—	—	—	167	167
Write cycle time, nanoseconds	—	—	—	225	225
Bits fetched per cycle	—	—	—	Up to 16	Up to 16
MAXIMUM I/O SPEEDS					
80-column card reading	300 cpm	600 cpm	600 cpm	1,400 cpm	1,400 cpm
80-column card punching	100 cpm	100 cpm	100 cpm	300 cpm	300 cpm
96-column card reading	500 cpm	500 cpm	500 cpm	1,000 cpm	1,000 cpm
96-column card punching	60 cpm	120 cpm	120 cpm	120 cpm	120 cpm
Printing (standard character sets)	300 lpm	750 lpm	750 lpm	1,040 lpm	1,040 lpm
Magnetic tape I/O	10 KB	36 KB	36 KB	120 KB	120 KB
MICR document input	None	900 dpm	900 dpm	1,625 dpm	1,625 dpm
AVAILABILITY OF PERIPHERALS					
Disk Cartridge Drives	Yes	Yes	Yes	Yes	Yes
Dual Disk Pack Drive	No	No	No	Yes	Yes
Head-per-Track Systems Memory	No	No	Yes	No	No
Head-per-Track Memory Banks	No	No	No	Yes	Yes*
Single-Line Communications Control	No	Yes	Yes	Yes	Yes
Multi-Line Communications Control	No	No	No	Yes	Yes

*8.1 million bytes of 20-millisecond head-per-track Systems Disk storage is standard in the B 1728 Central System; it can be expanded to 40.5 million bytes in 8.1-million-byte increments.

▷ The general characteristics of the five B 1700 Series processors are summarized in the accompanying table. Prospective users should note that the family can be logically subdivided into two categories: the small-scale "B 1710 Series," consisting of the B 1712, B 1714, and B 1718 Processors, and the considerably more powerful "B 1720 Series," consisting of the B 1726 and B 1728 Processors. The two B 1720 Series processors, in addition to their faster cycle times, feature high-speed control memories and several other throughput-boosting features which are not present in the smaller models.

The low-cost B 1712 Processor 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 1720 systems range from about $70,000 to $120,000, with monthly lease prices ranging from $1,500 to $2,800. (To these prices, of course, prospective users must add the cost of Burroughs' unbundled software and support.)

The B 1714 Processor is twice as fast as the B 1712 and accommodates a considerably wider range of peripheral ▷

► resident MCP and the currently active Interpreters, while the remaining portions reside in main memory.

Other differences between the processor models, in addition to those shown in the chart, are as follows: (1) the B 1726 and B 1728 Processors have four additional microinstructions and four additional hardware registers beyond those of the B 1712, B 1714, and B 1718; (2) the B 1726 and B 1728 Processors have an address (A) stack consisting of 32 elements, each 24 bits wide, whereas the address stack in the B 1712, B 1714 and B 1718 Processors consists of only 16 elements, also 24 bits wide; (3) the B 1726 and B 1728, unlike the two smaller processors, have an 8-position Port Interchange that controls all accesses to main memory.

The B 1700 Series processors use a "soft" interrupt system, meaning that interrupt conditions do not cause any automatic hardware actions. Instead, the recognition of interrupt conditions and initiation of the appropriate actions is completely under software control.

PERFORMANCE: Burroughs states, the user experience tends to confirm, that the five B 1700 processors deliver from 1.15 to 5 times the internal processing speed of the IBM System/3. No execution times for individual microinstructions or S-instructions have been released to date. ►

Burroughs B 1700 Series

equipment; typical B 1714 systems range from about $75,000 to $200,000 in purchase price and from $1,600 to $3,500 in monthly lease price. A B 1712 Processor can readily be field-upgraded to a B 1714.

The B 1718 Processor offers the same central processor performance as the B 1714, but achieves an estimated 35 to 50 percent increase in overall throughput through the use of a 1.9-million-byte head-per-track disk as a systems memory unit. Typical B 1718 systems range from about $120,000 to $250,000 in purchase price and from $3,000 to $4,500 in monthly lease price. A B 1714 Processor can be field-upgraded to a B 1718.

The B 1726 Processor was the fastest of the three original members of the B 1700 family. In addition to higher central processor and main memory speeds than the B 1714, the B 1726 includes 2,048 or 4,096 bytes of 167-nanosecond control memory that provides fast-access storage for the microprograms that control its operations. (In the B 1712 and B 1714 Processors, by contrast, all microprograms reside in main memory along with the user's programs and data). The B 1726 also offers considerably higher I/O speeds, larger mass storage capacities, and improved communications capabilities. Typical B 1726 systems range from about $135,000 to $475,000 in purchase price and from $3,000 to $10,000 in monthly lease price.

The B 1728 Processor, introduced in July 1973, expands the capabilities of the B 1700 family by offering from 65,536 to 262,144 bytes of MOS main memory and 6,144 or 8,192 bytes of control memory. The B 1728's instruction repertoire and internal speeds are the same as those of the B 1726 Processor. An expanded input/output control system can accommodate up to 14 I/O controls, each on a separate channel. The basic B 1728-1 Central System includes 8.1 million bytes of 20-millisecond head-per-track Systems Disk storage, expandable to 40.5 million bytes in 8.1-million-byte increments. Typical B 1728 systems range from about $240,000 to $560,000 in purchase price and from $5,300 to $12,500 in monthly lease price.

The only indication of processor performance that Burroughs has released to date is a statement that the various B 1700 models will deliver internal processing speeds ranging from 1.15 to 5 times that of the IBM System/3 in typical applications. User experience tends to confirm the reasonability of these figures, placing the B 1700 Series systems at or near the top of their class in the price/performance derby. Unfortunately, Burroughs has chosen not to reveal any details about the processor timing considerations.

Technologically, the B 1700 systems are in tune with the times. They use medium-scale integration (MSI) logic circuits with processor cycling rates of up to 6 million cycles per second and MOS main memories with read

CONSOLE: A console control panel is an integral part of every B 1700 Series processor. It consists of a display panel plus a complement of switches used for manipulating registers and data.

The B 9340 Console Printer and its control unit are required components in every B 1700 system. The printer provides keyboard input and low-speed printed output, and serves as the primary interface between the operator and the Master Control Program.

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 a B 1712 or B 1714 system, 10 in a B 1718 system, 10 in a B 1726 system, and 14 in a B 1728 system.

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.

A B 1718 system can include a maximum of one console printer, one 9370 Systems Memory, two 9480 or 9481 Disk Cartridge subsystems, one or more punched card I/O units, one or more line printers, one MICR reader-sorter, one magnetic tape subsystem (10KB, 18KB, or 36KB), and two single-line data communications controls, up to a maximum of 10 I/O controls per system. The B 1718 Processor includes the I/O Expansion Feature.

The B 1726 and B 1728 Processors have eight different types of I/O subsystem "slots" which determine the number and types of I/O controls that can be connected. The maximum numbers of I/O controls that can be accommodated by the basic B 1726 Processor are as follows: five Type A, three Type B, one Type C, two Type D, two Type E, two Type F, one Type G, and one Type H. The maximum numbers of I/O controls that can be accommodated by the basic B 1728 Processor are as follows: four Type A, three Type B, one Type C, two Type D, two Type E, one Type F (in addition to the standard Systems Disk control), one Type G, and 1 Type H. The optional B 1305 I/O Expansion Feature gives either a B 1726 or B 1728 the capability to accommodate as many as five more Type A, three Type B, one Type C, or two Type D controls. The allowable combinations of controls, however, are limited by various interrelationships and by the overall maximum limit of 10 controls on a B 1726 and 14 on a B 1728.

Burroughs B 1700 Series

▷ cycle times as low as 667 nanoseconds per 24-bit access. The high-speed control memory, used only in the B 1726 and B 1728 Processors, provides 167-nanosecond bipolar storage for the most frequently used portions of the microprograms.

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 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 conventional 80-column card I/O equipment and 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.

Newly announced for the B 1700 Series systems is a Cassette Tape Subsystem that provides a low-cost alternative to punched cards as an input medium and can also provide program storage and file back-up. The tape cassettes are interchangeable between the B 1700 computer systems and other Burroughs business systems such as the Audit Entry Computers, the L 8000 systems, the B 700 systems, and Burroughs' extensive line of TC Series terminal computers.

A family of low-cost disk drives provides 2.3 or 4.6 million bytes of data storage on each single-disk cartridge. Larger-capacity disk pack drives and the time-tested Burroughs head-per-track disk files are available for use with the B 1726 and B 1728 systems. A compact 10KB magnetic tape unit is available for all four B 1700 systems, and the larger models can also make use of Burroughs' Magnetic Tape Clusters, which house two, three, or four tape drives and transfer data at 18KB or 36KB, or a variety of free-standing tape drives rated at up to 120KB. Nine line printers offer speeds ranging from 85 to 1100 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. A paper tape reader and punch were added to the peripheral line-up in July 1973, and an optical reading capability was added for B 1726 and B 1728 systems in October 1974.

The data communications capabilities of the B 1700 Series, initially quite limited, received a major boost ▷

▶ Devices which require Type A controls in B 1726 and B 1728 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 paper tape reader and punch, the 9247 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 the Single-Line Communications Control. Type E controls are required by the magnetic tape subsystem (except that the 10KB B9491-2 can alternatively use a Type B control). Type F controls are required by the head-per-track disk file subsystems. Type G controls are required by the disk pack subsystems. Type H controls are required by the Multi-Line Communications Control.

SIMULTANEOUS OPERATIONS: All I/O controls are buffered to permit overlapped read/write/compute operations. In addition, the Multi-Line Communications Control in B 1726 and B 1728 systems is connected directly to the Port Interchange, which controls access to main memory, rather than to the processor.

MASS STORAGE

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

9480-2: dual drives, stores 4,667,120 bytes total.

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 five 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 five B 1700 Series processor models. A 9480 subsystem consists of a 1480 control and one or two 9480-2 drive units, providing up to four spindles and storing up to 18.4 million bytes on-line. A 9481 subsystem consists of a 1481 control and one or two 9481-2 drive units, providing up to four spindles and storing up to 36.8 million bytes on-line. Each control has a 720-byte buffer that holds up to four 180-byte segments of data and is cleared in "rotating" fashion.

9499-7 DUAL DISK STORAGE/CONTROLLER: Usable only in B 1726 and B 1728 systems, this high-performance disk pack subsystem can consist of two to eight spindles with an on-line storage capacity of 87.2 million bytes per spindle. The 9499-7 includes a 1 x 4 Disk Pack Electronics Controller; to achieve a 1 x 8 capability, a 9499-9 Controller Expansion Adapter must be configured with the system. Each 9499-7 Disk Pack Subsystem must include a 1486-1 Disk Pack Control. Data is recorded on an 11-disk pack that is physically compatible but not format-compatible with the IBM 2316 Disk Pack. Average head movement time is 30 milliseconds, average rotational delay is 12.5 milliseconds, and data transfer rate is 625,000 bytes per second. The 9486-4 Dual Drive Add-On and/or the 9486-45 Single Drive Add-On can be ▶

Burroughs B 1700 Series

▷when Burroughs announced the 1352 Multi-Line Controller (MLC) in July 1973. The MLC gives the B 1726 and B 1728 Processors a welcome capability to control multiple-line networks. The basic 1352 handles up to 8 lines, and the 1353 MLC Extension (available only for the B 1728) permits a total of 16 lines to be controlled. Also available for use in B 1714, B 1718, B 1726 and B 1728 systems is the 1351 Single-Line Controller. The B 1712 system cannot be quipped with data communications facilities.

Thanks to the advent of the MLC, a B 1700 Series system can serve either as the central computer in a multiple-line communications network of modest size or as a high-powered remote terminal communicating with a larger central computer. To facilitate the development of communications control programs, Burroughs announced two new Program Products along with the MLC: Network Definition Language (NDL) and User Programming Language (UPL). NDL is a language and compiler that enable users to define and generate customized network control programs. UPL is an ALGOL-like language and compiler designed to aid experienced programmers in solving complex message handling problems.

Remote job entry capabilities are available for B 1714, B 1718, B 1726, and B 1728 systems through the B 1700 HASP Remote Terminal Product, announced in April 1974. The new communications software operates under control of the MCP operating system, permitting a B 1700 system to multiprogram on-site processing with remote job entry to IBM System/360 and 370 computers operating under the HASP binary synchronous multi-leaving protocol. Thus, the B 1700 becomes a likely contender for replacement of the numerous small System/360 and System/3 computers operating as remote batch terminals to larger IBM central sites.

Burroughs has also announced a remote job entry system that permits a B 1700 system to act as an intelligent remote terminal to either a B 2700/3700/4700 or a B 6700/7700 host computer system. This capability enables a B 1700 user to enter a job at his system for execution by the host computer, to monitor and control the execution of the program via the B 1700 supervisory printer, and to receive program output via the B 1700 printer or card punch or to direct the output to B 1700 disk files. A multiprogramming capability permits on-site processing to be performed concurrently with remote job entry functions.

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 32K bytes of main memory. (A smaller version of the MCP without ▷

▶added for a maximum subsystem capacity of eight spindles and 697.6 million bytes.

9499-8 DUAL DISK STORAGE/CONTROLLER: Usable only in B 1726 and B 1728 systems, this disk pack subsystem consists of two spindles of on-line storage with a storage capacity of 43.6 million bytes per spindle. Every 9499-8 must include a 1486-1 Disk Pack Control. Data is recorded on an 11-disk pack that is physically compatible but not format-compatible with the IBM 2316 Disk Pack. Average head movement time is 30 milliseconds, average rotational delay is 12.5 milliseconds, and data transfer rate is 625,000 bytes per second. There are no add-on increments for the 9499-8; however, the 9499-8 Dual Disk Storage/Controller can be field-upgraded to the 9499-7 Dual Disk Storage/Controller.

HEAD-PER-TRACK SYSTEMS MEMORY DISK: Usable only on the B 1718 system, this unit provides rapid random access to system software and to compile, sort, and program work space on a nonremovable disk file with a fixed read/write head serving each track. The 9370-3 System Memory stores 1.9 million bytes with an average access time of 17 milliseconds. An integrated Systems Memory Control is a standard feature of the B 1718 Processor.

HEAD-PER-TRACK MEMORY BANKS: Usable only in B 1726 or B 1728 systems, these units provide rapid random access to data on nonremovable disk files with a fixed read/write head serving each track. Two models are available. The 9371-7 Memory Bank stores 8.1 million bytes with an average access time of 20 milliseconds; up to 4 additional 8.1-million-byte modules can be added for a maximum subsystem capacity of 40.5 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. The basic B 1728-1 Central System includes a 1374 Control and one 8.1-million-byte module of the 20-millisecond 9371-7 storage; up to four additional 8.1-million-byte modules can be added.

Two Head-per-Track Exchanges provide increased subsystem capacities and/or dual access paths. The 1674-1 1 x 2 Adapter allows two Disk File Electronics Units (DFEU's) on one 1374 Disk File Control; up to five Memory Bank storage modules can be connected to each DFEU, thereby doubling the subsystem storage capacity. The 1674-2 2 x n Exchange allows interconnection of two 1374 Disk File Controls on two separate channels; each 1374 Control can handle one or two DFEU's, and up to five Memory Bank storage modules can be connected to each DFEU.

INPUT/OUTPUT UNITS

9490-25 CASSETTE TAPE SUBSYSTEM: Consists of a 1490 cassette control and one 9490-25 Cassette Tape Station. Records at a density of 800 bits per inch and has a capacity of up to 861 256-byte records. The transfer rate is 1,000 bytes per second. Available for B 1712, B 1714, B 1718, B 1726, and B 1728 systems.

9491-2 MAGNETIC TAPE DRIVE: Reads and records data on ½-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 ▶

Burroughs B 1700 Series

▷ multiprogramming, MICR, or communications capabilities is available for use on 24K systems.) Like the MCP's for the larger Burroughs computers, the B 1700 MCP is truly user-oriented and much easier to understand and use than most of the competitive operating systems. The MCP receives its orders through straightforward messages entered via the console keyboard or control cards.

The B 1700 Series systems, like the large-scale Burroughs B 6700 Series systems, will be programmed almost exclusively in higher-level languages. Compilers are available for the COBOL, RPG, FORTRAN, and BASIC languages, but not for PL/1. 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 present time, although Burroughs will, under separate contract, disclose details of the machine structure and microprogramming to universities and colleges for use in advanced computer science or special research activities.

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, utilities, and hospitals. In addition, Burroughs will, for a fee, provide all the support required to install and maintain a system.

Until Burroughs announces additional emulators, program compatibility with computers other than the IBM 1401/1440/1460 and Burroughs' own B 100/200/300/500 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 II (COBOL from IBM RPG Specifications) routine.

Data compatibility with most computer systems can be achieved via punched cards (80- or 96-column) or magnetic 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, together with the smaller B 700 systems announced in March 1973, effectively plug the sizeable product-line gap that once existed between the widely used Burroughs L Series accounting computers and the considerably larger B 2700 systems. Thus, they will surely prevent many current Burroughs users from moving to competitive systems (most commonly the ▷

▶ 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 of the B 1700 Series processor models, consist 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, B 1718, B 1726, or B 1728 systems:

    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 ½-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.

FREE-STANDING MAGNETIC TAPE UNITS: Burroughs offers six models of free-standing tape drives for use in B 1726 or B 1728 systems only. All six models read and record data on ½-inch tape in IBM-compatible formats. Their individual characteristics are as follows:

    9390:   7-track NRZI, 200/556 bpi, 18,000/50,000 char/second; up to 6 drives per 1390 Control.

    9391:   7-track NRZI, 200/556/800 bpi, 18,000/50,000/72,000 char/second; up to 6 drives per 1390 Control.

    9394-2: 9-track NRZI, 800 bpi, 96,000 bytes/second; up to 6 drives per 1394-2 Control.

    9495-2: 9-track phase-encoded, 1600 bpi, 120,000 bytes/second; up to 8 drives per 1495-2 Control.

    9496-2: 9-track phase encoded, 1600 bpi, 40,000 bytes/second; up to 8 drives per 1496-4 Control.

    9496-4: 9-track phase-encoded, 1600 bpi, 80,000 bytes/second; up to 8 drives per 1496-4 Control.

9115 CARD READER: Reads standard 80-column cards serially by column at a rated speed of 300 cpm. Reads EBCDIC or binary-coded cards. Cards are read photo-electrically, with a double strobe comparison for each column to help ensure reading accuracy. A single input hopper and output stacker hold up to 1000 cards each. Usable with any B 1700 Series system.

9116 CARD READER: Reads up to 600 cpm. Otherwise, has the same characteristics as the B 9115 described ▶

Burroughs B 1700 Series

IBM System/3) when they outgrow their L Series machines.

What's more, the B 1700 systems clearly have what it takes to attract hundreds, and quite possibly thousands, of new customers into the Burroughs fold. In competitive situations, the B 1712 and B 1714 systems will generally be up against the IBM System/3 Model 10 and smaller models of the Honeywell Series 200 or Series 60 and the NCR Century Series. Within this class, the B 1700 systems rank at or near the top in technology, flexibility, and performance. The larger B 1726 and B 1728 systems compete in the range of the IBM System/3 Model 15, the IBM System/370 Model 115 and Model 125, the UNIVAC 90/30, and the Honeywell 62/60 and 64/20—and even in this fast company, the advanced technology and user-oriented design of the Burroughs systems make them thoroughly competitive.

USER REACTION

Summarized below are the results of Datapro's interviews with 10 users of the Burroughs B 1700 computer systems. This sample included 6 of the more than 500 users of the small-scale B 1712 and B 1714 systems, 3 users of the more powerful B 1726 system, and 1 user who has had experience with B 1712, B 1714, and B 1726 systems. Of the six B 1712 and B 1714 systems, two replaced Burroughs electronic accounting equipment, two replaced IBM System/360 Model 20 systems, one replaced an NCR 100 computer system, and one was a new computer installation. One of the B 1726 systems was a replacement for several B 500 systems; 15 B 1726 systems in another installation were serving as data collection and remote job entry terminals to a B 6700 computer system; and the remaining B 1726 respondent did not indicate what, if any, data processing equipment his B 1726 system replaced. These B 1700 users gave their computer systems the following ratings:

	Excellent	Good	Fair	Poor	WA*
Ease of operation	10	0	0	0	4.0
Reliability of mainframe	4	5	1	0	3.3
Reliability of peripherals	1	4	5	0	2.6
Maintenance service:					
Responsiveness	3	5	2	0	3.1
Effectiveness	1	6	3	0	2.8
Technical support	2	3	2	3	2.4
Manufacturer's software:					
Operating system	8	2	0	0	3.8
Compilers and assemblers	7	3	0	0	3.7
Applications programs**	0	2	2	1	2.2
Ease of conversion	3	7	0	0	3.3
Overall satisfaction	3	7	0	0	3.3

* Weighted Average on a scale of 4.0 for Excellent.
**Five of the 10 users were not using Burroughs applications software.

As indicated by the perfect score of 4.0, all of these B 1700 users were enthusiastic about their systems' ease of

above. Usable with B 1714, B 1718, B 1726, or B 1728 systems.

9117 CARD READER: Reads up to 800 cpm. Otherwise, has the same characteristics as the B 9115 described above. Usable only with B 1726 or B 1728 systems.

9111/9112 CARD READER: Reads standard 80-column cards serially by column, on demand, at up to 800 cpm (9111) or 1400 cpm (9112). 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 or B 1728 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.

9213 CARD PUNCH: Punches standard 80-column cards at up to 300 cpm. The feed hopper holds up to 2200 cards, and three program-selectable stackers hold at least 1400 cards each. Usable only with B 1726 or B 1728 systems.

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.

9119-2 CARD READER: Reads 96-column cards at 1,000 cpm.

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 wati 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 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 printer station permits printed interpreta-

Burroughs B 1700 Series

operation. One delighted user described his B 1714 as "the simplest machine to run I've ever seen." In the same vein, the 10 users assigned a nearly perfect weighted average rating of 3.8 to the operating system for its effectiveness and for the comparative simplicity of the MCP multiprogramming environment. These users also gave an unusually high rating of 3.7 to the Burroughs language processors for the B 1700 computer systems.

Those who converted to B 1700 systems from competitive equipment related that the conversions using higher-level languages and the "filter" programs supplied by Burroughs were relatively straightforward and unmarred by traumatic experiences. In addition, two of the B 1700 users in this group who had used the emulators reported that both the B 100/200/300/500 and IBM 1400 Series emulators worked well and smoothly.

On the negative side, these 10 users gave Burroughs a relatively low average rating in the category of technical support. In several instances, users stated that although the available Burroughs support personnel were well trained and knowledgeable, there simply weren't enough of them available to provide adequate support for all B 1700 users installing new systems.

The users' ratings of mainframe and peripheral reliability make it clear that some of them experienced difficulties with hardware performance. The users singled out performance problems with the new dual-density Cartridge Disk Memory System as the primary cause of their dissatisfaction with the reliability of Burroughs peripherals. In addition, some users reported the usual number of "start-up" problems with the central processor units in the early stages of their installations. The nuisance effect of these CPU hardware bugs was compounded by the shortage of diagnostic facilities available to Burroughs field engineers, occasionally resulting in long periods of down-time. These users, however, have been assured by Burroughs that the performance problems of the disks are being corrected and that additional diagnostic aids for the central processors are being supplied.

In spite of these initial difficulties, the 10 respondents in this survey gave the B 1700 Series a healthy 3.3 average rating for overall satisfaction, reaffirming their confidence in the validity and effectiveness of the B 1700 Series design concepts. With its complement of software support now well established and its performance capabilities gaining wide recognition, the B 1700 Series appears to be well on its way to becoming one of the top competitors in the small-scale computer marketplace. □

tion 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, B 1718, B 1726, or B 1728 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.

B 9210 PAPER TAPE READER: Reads 5-, 6-, 7-, or 8-level punched tape at 500 or 1000 characters per second. The lower speed must be used for fanfold or metalized Mylar tape. Handles reels either 5.5 or 7 inches in diameter. A standard channel-select plugboard and optional Input Code Translator permit wide flexibility in codes. Usable only with B 1726 or B 1728 systems.

B 9220 PAPER TAPE PUNCH: Punches 5-, 6-, 7-, or 8-level tape at 100 characters per second. Handles supply reels up to 8 inches in diameter and 5.5- or 7-inch tape-up reels. A standard channel-select plugboard and optional Output Code Translator permit wide flexibility in codes. Usable only with B 1726 or B 1728 systems.

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

> 9249-1: 85-lpm Chain Printer (for B 1712, B 1714, and B 1718).
>
> 9249-2: 160-lpm Chain Printer (for B 1712, B 1714, and B 1718).
>
> 9249-3: 120-lpm Chain Printer (for B 1712, B 1714, B 1718, B 1726, and B 1728).
>
> 9240-3: 1040-lpm Drum Printer (for B 1726 and B 1728).
>
> 9247-2: 400-lpm Train Printer (for B 1714, B 1718, B 1726, and B 1728).
>
> 9247-3: 750-lpm Train Printer (for B 1714, B 1718, B 1726, and B 1728).
>
> 9247-14: 1100-lpm Train Printer (for B 1726 and B 1728).

All of the printers have 132 print positions. The 9247 Train Printers achieve their rated speeds with the standard 48-character train module; other interchangeable modules containing 16, 64, or 96 printable characters are also available, and the 96-character set contains both upper and lower case alphabetics. The 9247 Train Printers ▶

Burroughs B 1700 Series

► handle 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.

MICR READER-SORTERS: Burroughs offers six MICR reader-sorters for use with the larger B 1700 Series systems, including the new, low-cost 9135/9136 series:

9136-5: 600 dpm, 8 pockets (for B 1714, B 1718, B 1726, and B 1728).

9136-6: 600 dpm, 12 pockets (for B 1714, B 1718, B 1726, and B 1728).

9135-2: 900 dpm, 8 pockets (for B 1714, B 1718, B 1726, and B 1728).

9135-3: 900 dpm, 12 pockets (for B 1714, B 1718, B 1726, and B 1728).

9134-1: 1625 dpm, 4, 8, 12, or 16 pockets (for B 1726 and B 1728).

The 9135/9136 Reader-Sorters can process intermixed documents of varying lengths, widths, and weights. The input hopper holds a 17.5-inch stack of documents, and each of the 8 or 12 pockets can hold a 3.5-inch stack. Documents can be loaded and removed while the unit is in operation. Other features include positive detection of mis-sorts and double documents, a resettable item counter, and a basic off-line sorting capability.

The 9134-1 Reader-Sorter is a high-performance unit that can be equipped with a variety of optional features, including a numeric optical character recognition feature.

COMMUNICATIONS CONTROL

1351 SINGLE-LINE CONTROL: Provides the interface between a single leased or switched communications line and a B 1714, B 1718, B 1726, or B 1728 Processor; not usable with the B 1712 Processor. A maximum of two 1351 Controls can be used in a B 1714 system, and a maximum of four can be used in a B 1726 or B 1728 system. Each control must be equipped with an appropriate line adapter. Thirteen different line adapters, as listed in the Equipment Prices section, 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, synchronous, or binary synchronous mode. The transmission code is 7-bit ASCII plus parity.

1352 MULTI-LINE CONTROLLER: Provides the interface between a B 1726 or B 1728 Processor and up to eight leased or switched communications lines. With the 1353 Controller Extension, available for use in B 1728 systems only, a total of up to 16 lines can be serviced. The 1352 MLC must be equipped with an appropriate line adapter for each line. Thirteen different line adapters, as listed in the Equipment Prices section, 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, synchronous, or binary synchronous mode. The transmission code is 7-bit ASCII plus parity.

The 1352 MLC interfaces directly with B 1726 or B 1728 main memory through the Port Interchange, thereby reducing the demands it imposes upon the central processor. Although the MLC performs numerous communications control functions and operates in a largely processor-independent manner, it is a hard-wired controller rather than a programmable communications processor.

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 32K 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 (1) controls data communications devices and MICR reader-sorters.

MCP II is written in Burroughs' Software Development Language (SDL), a high-level language oriented toward facilitating the writing of systems software. Therefore, whenever MCP II is in use, all or part of the SDL Interpreter must be resident in memory. The total memory residence requirement for MCP II is approximately 13K bytes at present.

MCP I runs on any B 1712 or B 1714 processor equipped with at least 24 bytes of main memory, console printer, dual disk cartridge drive, line printer, and 96-column card reader. It performs must 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.

The memory-resident portion of MCP I, unlike that of MCP II, is microcoded. Therefore, the SDL Interpreter does not need to be present when MCP I is used. The total memory residence requirement for MCP I is approximately 6K bytes at present.

COBOL: The B 1700 COBOL language is an essentially complete implementation of full American National Standard COBOL except for the Report Writer module, which is omitted from the B 1700 version. 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 32K bytes of main memory, console printer, disk ►

Burroughs B 1700 Series

drive, line printer, and card reader. The compiler itself requires about 12K bytes of memory. Object programs generated by the COBOL compiler are expressed in an S-language that is oriented toward efficient handling of 4-bit digits and 8-bit characters. The COBOL Interpreter, required at execution time, occupies about 3K bytes of 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. The compiler permits 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 limiations imposed by the computer's memory capacity. The RPG Compiler runs on any B 1700 processor with at least 24K bytes of main memory under MCP I or 32K bytes of main memory under MCP II, plus console printer, disk drive, line printer, and card reader. The compiler itself requires about 8K bytes of memory. The RPG Interpreter—which is actually the same interpreter used for COBOL object programs—occupies about 3K bytes of 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 to provide features available in IBM FORTRAN IV Level H. The FORTRAN compiler runs on any B 1700 processor with at least 40K bytes of main memory, console printer, disk drive, line printer, and card reader. The compiler itself requires about 16K bytes of memory. Object programs produced by the FORTRAN compiler are expressed in an S-language that is oriented toward efficient handling of 36-bit "words" and 72-bit "doublewords." The FORTRAN Interpreter, required at execution time, occupies about 3.5K bytes of 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 32K bytes of main memory, console printer, disk drive, line printer, and card reader. The compiler itself requires about 8K bytes of memory. Object programs produced by the BASIC compiler are expressed in an S-language that is oriented toward efficient handling of 40-bit (5-character) "words." The BASIC Interpreter, required at execution time, occupies about 3K bytes of memory in addition to the object program's requirements. At a later date, Burroughs plans to deliver a BASIC compiler that will permit interactive, conversational problem-solving.

REPORTER: The Reporter System enables users to generate customized report programs from simplified free-form statements describing the contents of the reports to be produced. Its output is COBOL source code, ready for compilation and execution on either a one-shot or production basis. Reports can be created from information contained in standard disk, tape, or card files or from data base files created by Disk FORTE. To describe the files and generate the necessary vocabulary (a one-time operation), VOCAL (Vocabulary Language) allows direct reference to COBOL data names and file layouts in existing COBOL source programs; alternatively, the data names and descriptions can be entered separately in standard COBOL notation.

The reports to be reproduced are described in a concise, English-like language that is largely self-documenting. Numerout default features make it unnecessary to specify each option. The user specifies each data element by name only, and is not required to know its size or format. In similar fashion, the user need only specify the column headings, and the system will automatically handle all other aspects of formatting the output. A security system denies access to sensitive data items by unauthorized users. The Reporter System runs on a B 1726 or B 1728 Processor and requires 30K bytes of main memory, two million bytes of disk storage for the Reporter programs and files, a console printer, one card input device, and one line printer.

NETWORK DEFINITION LANGUAGE (NDL): This special-purpose programming tool enables users to define and generate customized Network Controller programs for data communications applications. The Network Controller handles line disciplines, buffer management, message queuing, and auditing, and supervises the flow of messages between user-coded programs and remote terminals. This enables the user's application programs to deal with remote terminals in the same manner as with conventional on-site peripheral devices. After the programmer defines his custom Network Controller in the NDL syntax, the source statements are processed by the NDL Compiler and converted into the necessary object code and tables. NDL runs under MCP II on a B 1714, B 1718, B 1726, or B 1728 with at least 40K bytes of main memory.

USER PROGRAMMING LANGUAGE (UPL): This ALGOL-like compiler language is designed to facilitate the solution of complex logic and decision-making problems, primarily in the design of data communications message control programs. UPL is a procedure-oriented language with extensive subscripting, string manipulation, and data concatenation facilities. Arrays and data substructures can be defined in bit or character formats. The UPL Compiler and its object programs operate under MCP II supervision on any B 1700 Series system with at least 32K bytes of main memory. UPL can be used to prepare a customized Message Control System (MCS) for use with an NDL-generated Network Controller when the user wishes to exert control over system decisions such as security, file control, error handling, preprocessing, or postprocessing.

RPG TO COBOL TRANSLATOR (COFIRS II): This machine translation system converts source programs written in B 1700 RPG language (which is largely, though not completely, compatible with IBM's RPG and RPG II) into COBOL source programs. The COFIRS II translation must be preceded by a pass through the B 1700 RPG compiler (to check the syntax of the RPG source program) and followed by a B 1700 COBOL compilation (to generate the object program). COFIRS II can be used under MCP I or MCP II on any B 1700 Series system with at least 32K bytes of main memory.

B 100/200/300/500 EMULATOR: This emulator enables a B 1714, B1726, or B 1728 to execute object programs written for the popular second-generation Burroughs B 300 Series computers. The emulator is essentially a microcoded B 300 Series instruction set that has been implemented in the variable micrologic of the B 1700 Series. The following B 300 Series peripheral devices are directly replaced by their B 1700 Series counterparts: 80-column card readers and punches, buffered line printers, magnetic tape units, disk files, and the supervisory printer. On-line banking systems, data communications terminals, MICR reader-sorters, and ➤

Burroughs B 1700 Series

▶ 6-tape listers, however, are not supported under emulation. The current version of the B 300 Series emulator is a "stand-alone" program that cannot be run under MCP control.

IBM 1401, 1440, 1460 EMULATOR: This emulator enables a B 1726 or B 1728 to execute object programs written for an IBM 1401, 1440, or 1460 computer. The emulator is essentially a microcoded IBM 1400 Series instruction set that has been implemented in the variable micrologic of the B 1700 Series. The emulator supports most of the 1041/1440/1460 processor functions and all of the standard peripheral equipment except MICR, OCR, paper tape, and data communications devices. Burroughs states that the emulator will normally execute instructions two to three times as fast as the original 1400 Series system, while the I/O operations will normally be performed at peripheral speeds. The emulators requires a B 1726 or B 1728 system with at least 49K bytes of main memory and 4K bytes of control memory. The initial version of the emulator, released in the third quarter of 1973, is a "stand-alone" program that cannot be run under MCP control. Therefore, it is not currently possible to intermix 1401/1440/1460 programs and B 1700 programs in a multiprogramming environment.

UTILITY ROUTINES: A disk sort program sorts records into ascending or descending sequence in accordance with specification cards that describe the input and output files, the key field or fields, and various outions. The sort function can also be invoked from within a COBOL or RPG source program. The user can specify either of two sorting techniques; vector replacement (the one most commonly used) or in-place (which minimizes the amount of disk storage space required).

Other B 1700 Series utility routines include System Loading Procedures, Disk Cartridge Initializer, Disk File Copy, Memory Dump, Memory Dump Analyzer, File/Loader, File/Puncher, and DMPALL. The last-named routine is a flexible listing and reproducing program for printing the contents of files and transcribing data from one medium to another.

Disk-FORTE II is a file management system that enables a user to structure and maintain data files in disk storage. The files may have any of four distinct types of organization: indexed sequential, random, indexed random, and unordered. Appropriate search strategies are used to access the data records in each type of file. "Pointers" can be defined to establish chaining and linking network structures among the files. Disk-FORTE II generates COBOL source code which is compiled along with the user's application programs.

HASP REMOTE TERMINAL PROGRAM: Permits a B 1714, B 1718, B 1726, or B 1728 system to function as a remote batch terminal on-line to IBM System/360 and 370 computer systems that utilize the HASP Binary Synchronous Multileaving Protocol. With the HASP Remote Terminal Program, a B 1700 system can be made functionally equivalent to a standard IBM 360/20 HASP workstation. Communication between the B 1700 and the central system are conducted utilizing the standard IBM binary synchronous line procedures. The transmission code is EBCDIC. Two modes of operation are supported. In the Spool Mode, input data from the B 1700 peripheral devices is compressed, blocked, and stored on a disk file for later transmission to the central processor, and data records returned from the central system are stored on disk for subsequent output to printers or card punches. In the Direct Mode, input data is blocked and transmitted to the central system, and data records returned from the central system are immediately deblocked and routed to the appropriate output devices.

The B 1700 HASP Remote Terminal Program operates under the MCP II operating system, permitting the remote job entry function to be multiprogrammed with local processing. Line speeds of up to 9,600 bps are supported over leased or dial-up lines in half-duplex mode. The program requires a B 1714, B 1718, B 1726, or B 1728 Processor, 32K bytes of main memory (in addition to that required for MCP II), an 80-column card reader, a line printer, disk subsystem, and binary synchronous communications adapter.

APPLICATION PROGRAMS: Burroughs offers a library of Business Management Systems which are designed to provide operational control through comprehensive management reports. The basic Business Management System (BMS) consists of four main modules: Invoicing, Accounts Receivable, and Inventory Control System; Accounts Payable System; Payroll System; and General Ledger System. Each of these main modules, in turn, consists of 10 or more submodules. By combining some of these standard BMS modules and submodules with other routines oriented toward the needs of specific types of businesses, Burroughs has developed a Wholesale Management System, a Manufacturing Management System, and a Utilities Management System, with others to follow.

Still more specialized in their orientation are the Bank Management System, the Financial Management System, the Budgetary Management System, the Local Government Management System, the Local Government and Utility Management System, the Industrial Management System, the Hospital Management System, and the Scholastic programs for school administration.

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.

B 1712 ENTRY-LEVEL 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 approximately $1,600 and $70,835, respectively.

TYPICAL B 1714 SYSTEM: Consists of 24K B 1714 Processor with 2K bytes of Control Memory, console printer, 300-cpm card reader, 100-cpm card punch, 250-lpm printer with 132 print positions, and dual disk cartridge drives (9.2 million bytes). Monthly rental and purchase prices are approximately $2,560 and $105,900, respectively.

TYPICAL B 1718 SYSTEM: Consists of 32K B 1718 Central Processor with console printer and integrated systems memory I/O control, head-per-track systems memory (1.9 million bytes), 600-cpm card reader, 100-cpm card punch, 750-lpm printer, and dual-disk cartridge drive (9.2 million bytes). Monthly rental and purchase prices are approximately $4,500 and $185,800, respectively. ▶

Burroughs B 1700 Series

►TYPICAL B 1726 SYSTEM: Consists of 65K B 1726 Central Processor, console printer, 600 cpm card reader, 300-cpm card punch, and dual-disk storage/controller (87.2 million bytes). Monthly rental and purchase prices are approximately $5,900 and $256,400, respectively.

TYPICAL B 1728 SYSTEM: Consists of 163K B 1728-1 Central System (including Control Memory, console printer, and 8.1 million bytes of Systems Disk storage), 800-cpm card reader, 300-cpm card punch, 1100-lpm printer with 132 print positions, two 80 KB magnetic tape units, and one dual-disk storage controller (174.4 million bytes). Monthly rental and purchase prices are $10,200 and $451,500, 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 and other "program development aids" are offered at the following monthly license fees: COBOL—$50, RPG—$50, FORTRAN—$100, BASIC—$70, COFIRS—$200, MICR Input Utility—$50, MDL—$50, UPL—$200, B 300 Series Emulator—$200, and IBM 1401/1440/1460 Emulator—$275. 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.

DEBUGGING TIME: For B 1712 and B 1714 systems, Burroughs allows 1 hour of testing and debugging time for each $100 of monthly rental or $3,000 of purchase price, with the total not to exceed 30 hours. For B 1726 and B 1728 systems, the allowance is 6 hours for each $1,000 of monthly rental or $48,000 of purchase price, with the total not to exceed 120 hours.

The B 1700 Series console has recently been restyled as shown above. It is functionally the same as the earlier console design shown in the preceding photo.

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.

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. An alternative 5-year lease plan that provides unlimited maintenance coverage (24 hours/day, 7 days/week) is available for B 1726 and B 1728 systems at a discount of 5 percent from the 1-year lease price.

All lease plans may include purchase options which allow 50% of the rental paid during the first 36 months to be applied toward the purchase price at any time during the lease period.

Purchased B 1700 Series equipment is covered by a 1-year warranty on the central processor, memory, and I/O controls and by a 90-day warranty on all peripheral equipment.■

Burroughs B 1700 Series
EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
PROCESSORS AND MAIN STORAGE				
B1712	Processor with 16K bytes of memory	27,225	99.20	569
Memory Options for B 1712 Processor:				
B 1012-24	24K Bytes Total Memory	5,000	11.00	151
B 1012-32	32K Bytes Total Memory	12,500	17.60	402
B 1012-40	40K Bytes Total Memory	17,500	29.80	553
B 1714	Processor with 16K bytes of memory	34,225	105.00	790
Memory Options for B 1714 Processor:				
B 1014-24	24K Bytes Total Memory	6,500	14.40	201
B 1014-32	32K Bytes Total Memory	12,500	19.90	402
B 1014-40	40K Bytes Total Memory	20,000	27.60	553
B 1014-48	49K Bytes Total Memory	26,000	39.70	704
B 1014-56	57K Bytes Total Memory	32,000	52.90	855
B 1014-64	65K Bytes Total Memory	38,000	67.40	1,006
B 1718	Processor with 32K bytes of memory, console printer and control, and system memory control	63,165	160.00	1,695
Memory Options for B 1718 Processor:				
B 1018-40	40K Bytes Total Memory	7,500	7.80	151
B 1018-48	49K Bytes Total Memory	13,500	19.90	301
B 1018-56	57K Bytes Total Memory	19,500	33.10	452
B 1018-64	65K Bytes Total Memory	25,500	47.50	602
B 1726	Processor with 24K bytes of main memory, 2K bytes of Control Memory, and console and table	87,300	154.00	1,940
Memory Options for B 1726 Processor:				
B 1026-32	32K Bytes Total Memory	5,400	11.00	85
B 1026-40	40K Bytes Total Memory	10,800	17.70	205
B 1026-49	49K Bytes Total Memory	16,200	24.30	325
B 1026-57	57K Bytes Total Memory	21,600	30.90	460
B 1026-65	65K Bytes Total memory	27,000	38.70	610
B 1026-81	81K Bytes Total Memory	35,800	51.90	810
B 1026-98	98K Bytes Total Memory	44,600	66.20	910
B 1026-131	131K Bytes Total Memory	53,400	94.80	1,210
B 1728-1	Central System; includes 6,144 bytes of control memory, 65,536 bytes of main memory, I/O base, console and table, console printer and control, disk file control and electronics unit, and 8.1 million bytes of Systems Disk storage	185,150	458.00	4,025
Memory Options for B 1728-1 Processor:				
B 1028-81	81,920 Bytes Total Memory	11,000	13.20	250
B 1028-98	98,304 Bytes Total Memory	19,800	27.60	450
B 1028-114	114,688 Bytes Total Memory	28,600	40.90	650
B 1028-131	131,072 Bytes Total Memory	37,400	54.10	850
B 1028-147	147,456 Bytes Total Memory	46,200	67.40	1,050
B 1028-163	163,840 Bytes Total Memory	55,000	80.50	1,250
B 1028-180	180,224 Bytes Total Memory	63,800	93.80	1,450
B 1028-196	196,608 Bytes Total Memory	72,600	107.00	1,650
B 1028-212	212,992 Bytes Total memory	81,400	120.00	1,850
B 1028-229	229,376 Bytes Total Memory	90,200	133.00	2,050
B 1028-245	245,760 Bytes Total Memory	99,000	147.00	2,250
B 1028-262	262,144 Bytes Total Memory	107,800	160.00	2,450
Processor Options:				
A/B 1305	I/O Expansion Feature (for all processors)	1,500	5.60	30
A/B 9340	Console Printer (for B 1712, B 1714, B 1718, or B 1726)	2,640	17.90	55
A 1340	Console Printer Control (for B 1712, B 1714 or B 1718)	1,800	5.60	60
B 1340	Console Printer Control (for B 1726)	2,230	5.60	60
B 1026-2	2,048 Bytes Additional Control Memory (for B 1726)	9,600	33.10	400
B 1028-2	2,048 Bytes Additional Control Memory (for B 1728)	9,600	33.10	400
B 1097-3	Console Corner Table (for B 1726 or B 1728)	720	0	15
B 1098	Processor Extension Cabinet (for B 1728)	9,900	16.60	225
B 9374-17	Add-On Systems Disk module; 8.1 million bytes (max of 4; for B 1728)	19,200	130.00	400
MASS STORAGE				
9480-1	Single Disk Cartridge Drive; 2.3 million bytes	10,000	34.20	253
A/B 9480-2	Dual Disk Cartridge Drive; 4.6 million bytes	15,480	61.30	369
A 9481-1	Single Disk Cartridge Drive; 4.6 million bytes	13,200	51.90	313
A/B 9481-2	Dual Disk Cartridge Drive; 9.2 million bytes	21,600	83.40	484
A 1480	Control for 9480-1 & 9480-2 Drives (B 1712/1714/1718)	2,700	15.40	90
B 1480	Control for 9480-2 Drives (B 1726/1728)	4,665	16.60	97
A 1481	Control for 9481-1 & 9481-2 Drives (B 1712/1714/1718)	3,500	16.60	100
B 1481	Control for 9481-2 Drives (B 1726/1728)	4,665	16.60	97
A/B 9985-2	Disk Cartridge for 9480-1 & 9480-2 Drives	170	—	—

*Rental prices include equipment maintenance.

Note: Peripherals and controls with prefix "A" are used with B 1712, B 1714 and/or B 1718 systems, while those with prefix "B" are used with B 1726 and/or B 1728 systems.

DECEMBER 1974

Burroughs B 1700 Series
EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
MASS STORAGE (Continued)				
A/B 9985-3	Disk Cartridge for 9481-1 & 9481-2 Drives	225	—	—
B 9499-7	Dual Disk Storage/Controller; 174.4 million bytes (includes 1 x 4 DPEC)	56,000	283.00	1,363
B 9499-8	Dual Disk Storage/Controller; 87.2 million bytes	44,800	283.00	1,111
B 9499-9	Controller Expansion Adapter; provides 1 x 8 capability for B 9499-7	2,420	5.60	56
B 9486-45	Single Disk Pack Drive Add-On Increment for B 9499-7; 87.2 million bytes	32,500	119.00	700
B 9486-4	Dual Disk Pack Drive Add-On Increment for B 9499-7; 175 million bytes total	43,000	195.00	925
B 1486-1	Disk Pack Control for B 9499-7 and B 9499-8 drives	11,200	158.00	255
B 9499-1	1 x 4 Disk Pack Exchange Control	15,180	47.30	345
B 9499-2	1 x 8 Disk Pack Exchange Control	17,600	52.50	400
B 9974-4	Disk Pack	690	—	30
9370-3	Head-per-Track Systems Memory; 1.9 million bytes (for B 1718)	21,600	101.00	450
B 9371-7	Head-per-Track Memory Bank; 8.1 million bytes	28,800	232.00	606
B 9371-14	Head-per-Track Memory Bank; 14 million bytes	36,000	244.00	758
B 9374-17	8.1-Million-Byte Add-On Unit for B 9371-7	19,200	109.00	404
B 9374-10	14-Million-Byte Add-On Unit for B 9371-14	26,400	121.00	556
B 1374	Control for Head-per-Track Memory Banks (B 1726/1728)	9,600	13.90	200
B 1674-1	1 x 2 Head-per-Track Adapter	1,980	8.20	45
B 1674-2	2 x n Head-per-Track Exchange	1,760	5.90	40
MAGNETIC TAPE EQUIPMENT				
A/B 9381-12	Magnetic Tape Cluster; 18KB, 2 stations	25,200	197.00	530
A/B 9381-13	Magnetic Tape Cluster; 18KB, 3 stations	26,960	221.00	576
A/B 9381-14	Magnetic Tape Cluster; 18KB, 4 stations	32,160	266.00	687
A/B 9381-22	Magnetic Tape Cluster; 36KB, 2 stations	33,600	226.00	707
A/B 9381-23	Magnetic Tape Cluster; 36KB, 3 stations	43,200	260.00	909
A/B 9381-24	Magnetic Tape Cluster; 36KB, 4 stations	52,800	294.00	1,111
A 1381	Magnetic Tape Cluster Control (B 1714/1718)	6,000	41.90	253
B 1381	Magnetic Tape Cluster Control (B 1726/1728)	6,960	41.90	253
A/B 9491-2	Magnetic Tape Unit; 10KB, 9 Tracks	8,600	23.20	217
A 1491-2	10KB Tape Control (B 1712/1714/1718)	3,900	10.50	200
B 1491	10KB Tape Control (B 1726/1728)	10,368	33.10	216
B 9390	Magnetic Tape Unit; 18/50KC, 7 tracks	15,860	164.00	333
B 9391	Magnetic Tape Unit; 18/50/72KC, 7 tracks	18,000	186.00	379
B 9394-2	Magnetic Tape Unit; 96KB, 9 tracks	20,400	192.00	429
B 1390	Magnetic Tape Control; 18/50/72KC, 7 tracks (B 1726/1728)	6,960	41.90	250
B 1394-2	Magnetic Tape Control; 96KB, 9 tracks (B 1726/1728)	12,300	44.10	300
B 9496-2	Magnetic Tape Unit; 40KB, 9 tracks	12,800	71.70	273
B 9496-4	Magnetic Tape Unit; 80KB, 9 tracks	15,300	76.10	323
B 1496-4	Magnetic Tape Control; 40/80KB, 9 tracks (B 1726/1728; requires B 9499-30 or -31)	15,740	58.50	328
B 9499-30	Master Electronic Exchange; 1 x 4 (for B 1496-4)	5,500	22.10	125
B 9499-31	Master Electronic Exchange; 1 x 8 (for B 1496-4)	8,800	22.10	200
B 9499-32	Master Electronic Exchange, 2 x 8 (for B 1496-4)	13,200	47.50	300
B 9495-2	Magnetic Tape Unit; 120KB, 9 tracks	16,650	81.60	425
B 1495-2	Magnetic Tape Control; 120KB, 9 tracks (B 1726/1728; requires B 9499-10 or -11)	19,130	58.50	460
B 9499-10	Master Electronic Exchange; 1 x 4 (for B 1495-2)	5,800	22.10	125
B 9499-11	Master Electronic Exchange; 1 x 8 (for B 1495-2)	9,100	22.10	200
A/B 9490-25	Magnetic Tape Cassette	1,940	7.10	56
A/B 1490-25	Control for A 9490-25	4,400	33.10	125
80-COLUMN CARD EQUIPMENT				
B 9111	Card Reader; 800 cpm	17,550	98.80	371
B 9112	Card Reader; 1400 cpm	23,325	150.00	514
A/B 9115	Card Reader; 300 cpm	4,900	27.60	130
A/B 9116	Card Reader; 600 cpm	6,890	38.60	206
B 9117	Card Reader; 800 cpm	9,540	47.50	265
A 1115	Control for A 9115 Reader (B 1712/1714/1718)	900	7.80	45
A 1116	Control for A 9116 Reader (B 1714/1718)	1,200	8.80	55
B 1111	Control for B 9111 & 9112 Readers (B 1726/1728)	2,332	7.80	48
B 1115	Control for B 9115, 9116, & 9117 Readers (B 1726/1728)	2,160	8.80	45
B 9917	Card Counter (for B 9111 & 9112)	240	—	5
B 9918	Postal Money Order Feature (for B 9111 & 9112)	1,440	6.00	30
B 9919	40-Column Read Switch (for B 9111 & 9112)	190	—	—
A 9210-1	Card Punch; 100 cpm	12,700	76.80	265
A 1210-1	Control for A 9210-1 Punch (B 1712/1714/1718)	4,320	15.40	90
B 9212	Card Punch; 150 cpm	21,870	125.00	456
B 9213	Card Punch; 300 cpm	26,960	159.60	562
B 1213	Control for B 9212 and B 9213 Punch (B 1726/1728)	4,320	15.40	90

*Rental prices include equipment maintenance.

Note: Peripherals and controls with prefix "A" are used with B 1712, B 1714 and/or B 1718 systems, while those with prefix "B" are used with B 1726 and/or B 1728 systems.

Burroughs B 1700 Series
EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
96-COLUMN CARD EQUIPMENT				
A/B 9119-1	Card Reader; 300 cpm	3,500	27.60	86
B 9119-2	Card Reader; 1000 cpm	9,600	55.70	222
A 9319-2	Card Reader Punch; reads 300 cpm, punches 60 cpm	7,990	66.20	202
A/B 9319-4	Card Reader Punch; reads 500 cpm, punches 120 cpm	11,190	100.00	313
A/B 9419-2	Card Reader Punch/Data Recorder; reads 300 cpm, punches 60 cpm	9,490	78.30	242
A/B 9419-6	Multi-Purpose Card Unit; reads 300 cpm, punches 60 cpm, sorts 300 cpm, prints 60 cpm	11,390	93.80	288
A 1119-1	Control for A 9119-1 (B 1712/1714/1718)	900	7.80	45
B 1119	Control for B 9119-1 (B 1726)	2,332	7.80	48
B 1119-2	Control for B 9119-2	4,500	7.80	100
A 1319-2	Control for A 9319-2 (B 1712/1714/1718)	1,900	11.00	65
A 1319-4	Control for A 9319-4 (B 1714/1718)	2,300	12.20	70
B 1319	Control for B 9319-2 & 9319-4 (B 1726)	3,628	12.20	75
A 1419-2	Control for A 9419-2 (B 1712/1714/1718)	1,900	11.00	65
A 1419-6	Control for A 9419-6 (B 1712/1714/1718)	2,100	12.20	70
B 1419	Control for B 9419-2 & 9419-6 (B 1726)	2,332	12.20	75
PAPER TAPE EQUIPMENT				
B 1120	Paper Tape Reader Control (B 1726/1728)	1,800	10.00	50
B 9120	Paper Tape Reader; 500/1000 char/sec.	16,000	83.40	303
B 9926	Input Translator for B 9120	6,960	11.90	147
B 1220	Paper Tape Punch Control (B 1726/1728)	2,100	21.00	60
B 9220	Paper Tape Punch; 100 char/sec.	15,300	77.40	263
B 9928	Output Translator for B 9220	6,850	11.90	130
LINE PRINTERS				
A/B 9247-2	Train Printer; 400 lpm, 120 positions	20,500	139.00	485
A/B 9247-3	Train Printer; 750 lpm, 120 positions	33,000	181.00	717
B 9247-14	Train Printer; 1100 lpm, 132 positions	46,500	268.00	1,010
A 9249-1	Printer; 85 lpm, 132 positions	8,500	66.20	242
A 9249-2	Printer; 160 lpm, 132 positions	11,200	77.20	283
B 9249-3	Printer; 250 lpm, 132 positions	15,000	104.00	379
B 9240-3	Printer; 1040 lpm, 132 positions	43,500	233.00	909
A 1247-2	Control for A 9247-3 Printer	2,800	15.40	150
A 1247-3	Control for A 9247-3 Train Printers	2,800	48.50	215
A 1249-1	Control for A 9249-1 (B 1712/1714/1718)	1,000	5.60	35
A 1249-2	Control for A 9249-2 (B 1712/1714/1718)	1,100	6.60	40
B 1243-1	Control for B 9240-3 Printer (B 1726/1728)	2,880	10.00	60
B 1247	Control for B 9247 Train Printers (B 1726/1728)	4,320	15.40	90
B 1249-3	Control for B 9249-3 Printer (B 1726/1728)	1,300	7.80	45
B 9942-2	Additional 12 Print Positions for B 9247 Train Printers	2,000	11.90	40
B 9942-9	Additional Train Module for B 9247 Train Printers	3,500	19.90	65
B 9949-2	12-Channel Format Tape Reader for B 9247 Train Printers	3,050	19.90	61
MICR READER-SORTERS				
A 9135-2	Reader-Sorter; 900 dpm, 8 pockets	48,230	476.00	1,060
A 9135-3	Reader-Sorter; 900 dpm, 12 pockets	59,250	515.00	1,380
A/B 9136-5	Reader-Sorter; 600 dpm, 8 pockets	43,260	248.00	900
A/B 9136-6	Reader-Sorter; 600 dpm, 12 pockets	47,100	298.00	980
B 9134-1	Reader-Sorter; 1625 dpm, 4 pockets (requires Feature B 9928-1)	49,200	388.00	1,035
A 1135	Control for A 9135-2 & 9135-3 (B 1714/B 1718)	6,000	33.10	150
A 1136	Control for A 9136-5 & 9136-6 (B 1714/B 1718)	6,000	33.10	150
B 1135	Control for B 9135-2 & 9135-3 (B 1726/1728)	6,480	33.10	200
B 1136	Control for B 9136-5 & 9136-6 (B 1726/1728)	6,998	25.40	162
B 1134	Control for B 9134-1 (B 1726/1728)	6,480	33.10	200
B 9932-1	Endorser (for B 9134-1)	9,000	59.50	202
B 9933-4	Extended Sort Control (for B 9134-1)	2,400	17.90	50
B 9935-2	Four-Pocket Module (for B 9134-1)	14,400	41.70	303
B 9935-3	Four-Pocket Module (pockets 17-32 on 9134-1; requires B 9935-1)	14,400	41.70	303
B 9935-1	Expansion Feature (for over 16 pockets on B 9134-1)	4,800	11.90	101
B 9938-1	Multi-Track E-13B Read (for B 9134-1)	18,000	65.50	379
B 9938-6	Numeric OCR A Optical character Recognition System (for B 9134-1)	46,000	141.00	1,010
COMMUNICATIONS CONTROLS				
A/B 1351	Single-Line Control (B 1714/1718/1726/1728)	2,000	8.80	50
B 1352	Multi-Line Controller (8 lines; B 1726/1728)	13,000	30.90	200
B 1353	Multi-Line Controller Extension (8 lines; for B 1728 only)	6,750	21.00	150
Data Communications Line Adapters:				
A/B 1650-1	Asynchronous Data Set Connect, up to 1200 bps	1,500	8.80	50

*Rental prices include equipment maintenance.

Note: Peripherals and controls with prefix "A" are used with B 1712, B 1714 and/or B 1718 systems, while those with prefix "B" are used with B 1726 and/or B 1728 systems.

Burroughs B 1700 Series
EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
COMMUNICATIONS CONTROLS (Continued)				
A/B 1650-2	Asynchronous Data Set Connect, up to 1800 bps	1,800	11.00	65
A/B 1650-5	Asynchronous Direct-Connect, up to 2400 bps	1,500	8.80	50
A/B 1650-6	Asynchronous Direct-Connect, up to 4800 bps	1,800	11.00	65
A/B 1650-7	Asynchronous Direct-Connect, up to 9600 bps	2,100	13.20	80
A/B 1651-1	Synchronous Data Set Connect, up to 2400 bps	1,500	8.80	50
A/B 1651-2	Synchronous Data Set Connect, up to 4800 bps	1,800	11.00	65
A/B 1651-3	Synchronous Data Set Connect, up to 9600 bps	2,100	13.20	80
A/B 1652-1	Asynchronous Data Set Connect for Teletypewriters	1,500	8.80	50
A/B 1652-5	Asynchronous Data Set Connect for Teletypewriters	1,500	8.80	50
B 1653-1	Binary Synchronous Data Set Connect, up to 2400 bps	8,800	35.00	200
B 1653-2	Binary Synchronous Data Set Connect, up to 4800 bps	9,900	37.50	225
B 1653-3	Binary Synchronous Data Set connect, up to 9600 bps	11,000	39.70	250

*Rental prices include equipment maintenance.

Note: Peripherals and controls with prefix "A" are used with B 1712, B 1714 and/or B 1718 systems, while those with prefix "B" are used with B 1726 and/or B 1728 systems.

SOFTWARE PRICES

	Single Payment	12 Monthly Payments	Annual Maint. Charge	Monthly Fee (3-Year Plan)	Monthly Fee (5-Year Plan)
SYSTEMS PROGRAMS*					
HASP Remote Terminal Program	1,260	116	33	35	33
REPORTER	3,000	275	75	75	72
Disk-FORTE II	11,000	1,008	275	275	264
BUSINESS MANAGEMENT SYSTEM					
Business Management System (Accounts Receivable, Accounts Payable, Payroll, General Ledger)	7,100	650	360	NA	NA
Business Management System**	9,500	857	360	NA	NA
Invoicing, Accounts Receivable, Inventory	3,200	290	160	NA	NA
Invoicing, Accounts Receivable, Inventory**	4,470	400	160	NA	NA
Accounts Payable	1,400	128	70	NA	NA
Accounts Payable**	2,445	224	70	NA	NA
Payroll	1,800	165	90	NA	NA
Payroll**	2,790	255	90	NA	NA
General Ledger	1,400	128	70	NA	NA
General Ledger**	2,445	224	70	NA	NA
BANK MANAGEMENT SYSTEM					
Bank Management System (DDA, Savings, Installment Loans, Certificate of Deposit, Proof and Transit, General Ledger)	6,900	630	345	NA	NA
Bank Management System**	9,475	870	345	NA	NA
Demand Deposit Accounting	2,500	230	125	NA	NA
Demand Deposit Accounting**	3,565	325	180	NA	NA
Proof and Transit	1,000	90	50	NA	NA
Proof and Transit**	2,095	190	105	NA	NA
Savings	1,500	140	75	NA	NA
Savings**	2,400	200	120	NA	NA
Installment Loans	1,000	90	50	NA	NA
Installment Loans**	2,130	195	110	NA	NA
Certificate of Deposit	750	70	35	NA	NA
Certificate of Deposit**	1,570	145	80	NA	NA
General Ledger	500	45	25	NA	NA
General Ledger**	1,510	140	75	NA	NA
FINANCIAL MANAGEMENT SYSTEM					
Demand Deposit Accounting—B 1726	9,000	—	—	250	—
Demand Deposit Accounting—B 1728	10,800	—	—	300	—
Time Deposit Accounting—B 1726	10,800	—	—	300	—
Time Deposit Accounting—B 1728	12,600	—	—	350	—
Consumer Loan Accounting—B 1726	7,200	—	—	200	—
Consumer Loan Accounting—B 1728	9,000	—	—	250	—
Mortgage Loan Accounting—B 1726	9,000	—	—	250	—
Mortgage Loan Accounting—B 1728	10,800	—	—	300	—
Item Processing System—B 1726	9,000	—	—	250	—
Item Processing System—B 1728	10,800	—	—	300	—
Batch Processing Structures—B 1726	1,800	—	—	50	—

* Prices of the other B 1700 Series systems software products (compilers, emulators, etc.) are listed under the "Software" heading on page 70C-112-04m.

**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).

Burroughs B 1700 Series
SOFTWARE PRICES

	Single Payment	12 Monthly Payments	Annual Maint. Charge	Monthly Fee (3-Year Plan)	Monthly Fee (5-Year Plan)
FINANCIAL MANAGEMENT SYSTEM (Continued)					
Batch Processing Structures—B 1728	2,700	—	—	75	—
On-Line Processing Structures—B 1726	5,400	—	—	150	—
On-Line Processing Structures—B 1728	7,200	—	—	200	—
INDUSTRIAL MANAGEMENT SYSTEM					
APT Level III (B 1726 & 1728)	6,300	580	150	150	144
Engineering Data Control (B 1726 & 1728)	4,500	415	100	100	96
Requirements Planning (B 1726 & 1728)	4,500	415	100	100	96
Inventory (B 1726 & 1728)	4,500	415	100	100	96
Work-In-Process (B 1726 & 1728)	6,000	550	140	140	135
HOSPITAL MANAGEMENT SYSTEM					
Patient Accounting	4,400	405	100	100	96
General Ledger	2,200	200	50	50	48
Medical Records	2,200	200	50	50	48
Payroll	2,200	200	50	50	48
OTHER APPLICATIONS SOFTWARE					
Scholastic Test Scorer System	3,400	310	95	95	91
On-Line Wholesale Distribution	10,000	917	278	NA	NA
Budgetary Management System—without training	3,000	275	150	NA	NA
Budgetary Management System—with training	4,000	366	150	NA	NA
Local Government Management System—without training	4,800	440	240	NA	NA
Local Government Management System—with training	6,000	550	240	NA	NA
Local Government and Utility Management System—without training	7,800	715	390	NA	NA
Local Government and Utility Management System—with training	9,350	857	390	NA	NA