

Rev 3/78

## Burroughs B 1700 Series

### MANAGEMENT SUMMARY

When Burroughs unveiled the B 1700 Series computers in June 1972, they constituted the most significant new line of small-scale data processing systems to reach the market place since IBM announced the System/3 in July 1969. Although the distinctions among the computer "generations" are becoming increasingly blurred, the B 1700 systems more clearly deserved to be called "fourth generation" computers than any others that had been introduced to date. During the four years since then, the B 1700 Series has been further enhanced and expanded.

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.

In October 1975, Burroughs announced six new central processor models for the small-scale end of the B 1700 product line. The new processor models are called the B 1705, B 1707, B 1709, B 1713, B 1715, and B 1717. All six are based on the B 1714 central processor, but they are marketed in specific application-oriented configurations, including two new, low-priced cardless computer systems.

Six months later, Burroughs repriced and reconfigured the upper end of the B 1700 Series. Three new configurations based on the larger and faster "B 1720" central processor were announced in April 1976, including new lower-priced versions of the B 1726 and B 1728 and a new low-cost, entry-level B 1720 system designated the B 1776. The new processor models replaced all the previous B 1700 systems in the Burroughs marketing line-up, including the B 1712, B 1714, B 1716, and B 1718 systems, and are available for immediate delivery. ➤

The B 1700 Series of small-scale business data processing systems offers a number of "fourth generation" features, including variable micrologic that enables the central processors to adapt themselves dynamically to the characteristics of each programming language. There are nine current models in the series, including five packaged systems designed for specific types of applications.

### CHARACTERISTICS

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

**MODELS:** B 1705, B 1707, B 1709, B 1713, B 1715, B 1717, B 1776, B 1726, and B 1728 Data Processing Systems.

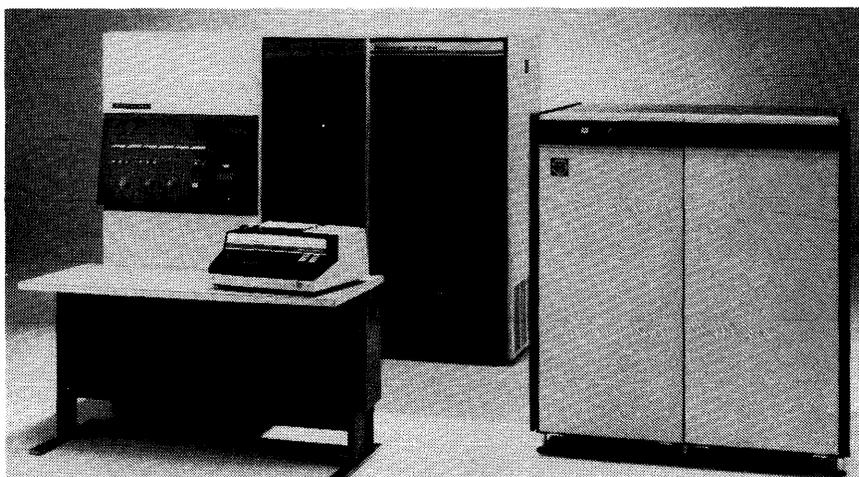
### MAIN STORAGE

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 1705—24,576 to 65,536 eight-bit bytes in 8,192-byte increments; B 1707—24,576 to 65,536 bytes in 8,192-byte increments; B 1709—49,152 to 65,536 bytes in 8,192-byte increments; B 1713—49,152 to 65,536 bytes in 8,192-byte increments; B 1715—32,768 to 65,536 bytes in 8,192-byte increments; B 1717—32,768 to 131,072 bytes in 8,192-byte increments up to 65,536 bytes and 16,384-byte increments from 98,304 to 131,072 bytes; B 1776—49,152 to 131,072 bytes in 16,384-byte increments. B 1726—65,536 to 262,144 bytes in 16,384-byte increments up to 131,072 bytes and 32,768-byte increments up to 262,144 bytes; B 1728—65,536 to 393,216 bytes in 16,384-byte increments up to 131,072 bytes and 32,768-byte increments up to 393,216 bytes. ➤

*The Burroughs B 1700 Series central processors feature "variable micrologic," an advanced form of microprogramming that adapts the processors' logical operations to the characteristics of the various programming languages for increased efficiency. Compilers are available for the COBOL, RPG, FORTRAN, and BASIC languages.*



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▷ 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 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.

The B 1700 central processors, with their "variable micrologic," 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. However, only two emulator programs have yet been released for the B 1700 systems: 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 all the B 1700 systems. The stand-alone emulator programs later were supplemented by "interpreter" programs which operate under control of the MCP operating system concurrently with B 1700 native-mode programs. Interpreters for the Burroughs B 300 and B 3500, the IBM 1130, and the IBM 1401 systems are now available for the entire line of B 1700 Series systems. Compatibility between the B 1700 and the IBM System/3 is achieved through the RPG II language.

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. Then, in March 1975, the B 1716 Processor was added to the B 1700 Series as an upgrade system for the smaller models. Customer deliveries of systems using the B 1712 and B 1714 Processors began in the third quarter of 1972, while B 1726 and B 1728 deliveries began in the second and third quarters of 1973, respectively. Deliveries of the B 1716 began in the second quarter of 1975. By January 1976, according to industry sources, Burroughs had delivered well over 1,300 of the B 1700 systems, with an estimated 400 systems still on order. The majority of systems installed to date utilize the smaller B 1712 and B 1714 Processors.

### PROCESSOR MODELS

Probably as a preliminary to the expected introduction of a new intermediate-scale series late in 1976, Burroughs restructured and repriced the entire B 1700 Series product line in 1975 and early 1976. As previously noted, six new processor models were announced in October 1975, all based on the B 1710 Processors. In April 1976, Burroughs completed its revamping of the B 1700 product line by enhancing and repricing the larger B 1726 and B 1728 systems and introducing an entry-level system based on

▶ **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 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 1705 through B 1717 Processors, and 32 in the faster B 1776 through 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.

No execution times for either individual microinstructions or S-instructions have been released by Burroughs to date.

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.

All B 1700 Series processor models are program-compatible and generally similar in architecture, with one major exception. In the B 1705, B 1707, B 1709, B 1713, B 1715, and B 1717 Processors, all microprograms reside in main memory along with the compiler-generated S code and user data. The faster B 1776, 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 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 1776, B 1726, and B 1728 Processors have four additional microinstructions and four additional hardware registers beyond those of the B 1705 through B 1717; 2) the B 1776, 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 1705 through B 1717 Processors consists of only 16 elements, also 24 bits wide; 3) the B 1776, B 1726, and B 1728, unlike the smaller processors, have an 8-position Port Interchange that controls all accesses to main memory.

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## CHARACTERISTICS OF THE B 1700 SYSTEMS

	B 1705	B 1707	B 1709	B 1713	B 1715	B 1717	B 1776	B 1726	B 1728
<b>CENTRAL PROCESSORS</b>									
Processor cycle time, nanoseconds	250	250	250	250	250	250	167	167	167
Maximum number of I/O controls	10	10	10	10	10	10	10	10	14
<b>MAIN MEMORY</b>									
Minimum capacity, bytes	24,576	24,576	49,152	49,152	32,768	32,768	49,152	65,536	65,536
Maximum capacity, bytes	65,536	65,536	65,536	65,536	65,536	131,072	131,072	262,144	393,216
Read cycle time, microseconds	1.0	1.0	1.0	1.0	1.0	1.0	0.667	0.667	0.667
Write cycle time, microseconds	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.0	1.0
Bits fetched per cycle	Up to 24								
<b>CONTROL MEMORY</b>									
Minimum capacity, bytes	None	None	None	None	None	None	2,048	4,096	6,144
Maximum capacity, bytes	None	None	None	None	None	None	4,096	6,144	8,192
Read cycle time, nanoseconds	—	—	—	—	—	—	167	167	167
Write cycle time, nanoseconds	—	—	—	—	—	—	225	225	225
Bits fetched per cycle	—	—	—	—	—	—	Up to 16	Up to 16	Up to 16
<b>MAXIMUM I/O SPEEDS</b>									
80-column card reading	1400 cpm								
80-column card punching	300 cpm								
96-column card reading	1000 cpm								
96-column card punching	100 cpm	120 cpm	120 cpm						
Printing (standard character sets)	1100 lpm	1040 lpm	1040 lpm						
Magnetic tape I/O	80 KB	120 KB	120 KB						
MICR document input	None	None	None	1625 dpm					
<b>AVAILABILITY OF PERIPHERALS</b>									
Disk Cartridge Drives	Yes								
Dual Disk Pack Drive	Yes								
Head-per-Track Systems Memory	Yes								
Head-per-Track Memory Banks	No	No	No	No	No	No	Yes	Yes	Yes*
Single-Line Communications Control	Yes								
Multi-Line Communications Control	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 B 1720 processor model, which is appropriately designated the B 1776 and is field-upgradable to B 1726 or B 1728 status.

The general characteristics of the current 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," now consisting of the B 1705, B 1707, B 1709, B 1713, B 1715, and B 1717, and the considerably more powerful "B 1720 Series," consisting of the B 1776, B 1726, and B 1728 systems. The B 1720 Series processors, in addition to their faster cycle times, feature high-speed control memories and several other throughput-boasting features which are not present in the smaller models.

Three of the new B 1710-based systems are special configurations which include a central processor and a basic complement of peripheral devices. Of these, the B 1707 and B 1709 are new cardless configurations designed to compete with the IBM System/3 Model 8, the Honeywell Model 61/60, and other small-scale systems targeted at first-time computer users.

The smaller of the two cardless systems, the B 1707, uses magnetic tape cassettes for data entry. The basic B 1707 system includes a central processor with 24K bytes of main memory, 9240 Operator Console and control, 9480 Disk Cartridge Drive and control with a capacity of 4.6

➤ 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.

## 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 10 in all B 1700 systems except the B 1728, where the maximum is 14.

**CONFIGURATION RULES:** The B 1705 Basic System is an entry-level system designed to be configured to meet the demands of users that do not want the packaged B 1700 configurations. It consists of a central processor and 24K bytes of main memory, expandable to a maximum of 65K. The B 1705 system can incorporate any peripherals (except MICR reader-sorters) available for B 1710 systems, up to a maximum of 10 I/O controls per system.

The B 1707 Magnetic Entry System includes an A 9340 Console, A 9480-12 Disk Cartridge Subsystem and Control, A 9249-2 Printer and Control, A 9490-25 Magnetic Tape Cassette and Control, and AE 306 Audit Entry Station. The basic configuration can be expanded to incorporate peripherals previously released for the B 1710 systems, with the exception of MICR reader/sorters, up to a maximum of four disk cartridge subsystems, two cassette tape stations, and two printers.

The B 1709 Direct Data Entry System includes an A 9340 Console, A 9480-12 Disk Cartridge Subsystem and Control, A 9249-2 Printer and Control, A 1351 Single-Line Communications Control, and two TD 101 Input/Display Stations and Keyboards. The basic system can be expanded to include any peripherals available with B 1710 systems,

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▷ million bytes, 9249-2 Line Printer (160 lines per minute), 9490-25 Tape Cassette Unit, and a free-standing AE 306 Audit Entry System (a cassette-oriented, minicomputer-based data entry station). The basic B 1707 Magnetic Entry System rents for \$1,950 per month and can be purchased for \$72,900. The B 1707 Magnetic Entry System operates under control of the MCP I or MCP II operating system. Programming languages available for the B 1707 are IBM-compatible RPG I and RPG II, ANS COBOL, FORTRAN, and BASIC.

The B 1709 Direct Data Entry System, the larger cardless configuration, uses CRT displays for data entry. The basic B 1709 configuration has a monthly rental of \$2,225 and a purchase price of \$77,900 and includes a central processor with 49K bytes of main memory, 9340 Console and control, 9480-12 Disk Cartridge Drive and control (4.6 million bytes), 9249-12 Line Printer and control (160 lines per minute), 1351 Single-Line Communications Control with 9600-bps direct connect adapter, and two TD 701 Input Display Stations with typewriter keyboard, poll and select options, and expanded memory feature. The B 1709 operates under control of the MCP II operating system and must include the separately priced B 1700 Data Entry software package, which provides software support for data entry from the TD 700 CRT displays. In addition, a separately priced B 1700 Text Editor program provides conversational file editing and manipulation capabilities. B 1709 installations which have not purchased the Text Editor program must include a card reader in order to perform program compilations.

Both the B 1707 and B 1709 can be enhanced to include up to 64K bytes of main memory. In addition, all peripheral equipment which was previously available for the B 1710-based systems can be attached to the B 1707 and B 1709 with the exception of MICR reader-sorters.

The B 1713 Financial MICR Systems are designed to provide remote MICR processing for both larger Burroughs and IBM computers. The basic B 1713 system includes a central processor with 49K bytes of main memory, 9340 Console and control, 9115 Card Reader and control (300 cards per minute), 9249-3 Line Printer and control (250 lines per minute), 9480-12 Disk Cartridge Drive and control (4.6 million bytes), 9135 MICR Reader-Sorter and control, and 1135 Single-Line Communications Control. The basic B 1713 configuration rents for \$3,083 per month and has a purchase price of \$127,900. The basic system can also be equipped with up to 64K bytes of main memory and any of the B 1710 peripheral devices, including disk pack drives. Software for the B 1713 includes the MCP II operating system, HASP RJE, remote job entry, RPG, COBOL, BASIC, FORTRAN, and the Burroughs Bank Management System applications programs.

The other three new processor models based on the B 1710 Processor are basic central processors which can be configured to suit each individual user. The entry-level B 1705 includes 24K bytes of main memory and provides

▶ with the exception of MICR reader-sorters, up to a maximum of 4 disk cartridge subsystems, 4 tape drives, 2 card I/O devices, 2 printers, and 16 TD 701 Input/Display Stations.

The B 1713 MICR Entry System includes an A 9340 Console, A 9480-12 Disk Cartridge Subsystem and Control, A 9115 Card Reader and Control, A 9249-3 Line Printer and Control, A 9135 MICR Reader-Sorter and Control, and A 1351 Single-Line Communications Control. The basic system can be expanded to incorporate any peripherals available for B 1710 systems up to a maximum of 4 disk pack drives, 4 magnetic tape units, 1 MICR reader-sorter, 2 card I/O units, 2 line printers, and 2 single-line communications controls, subject to the maximum of 10 I/O controls per system.

The B 1715 Mass Storage System can include a maximum of one console printer, four Disk Pack Drives, one or more punched I/O units, one or more line printers, four magnetic tape subsystems, and two single-line communications controls.

The B 1717 Extended Memory System can include one console printer, four disk pack drives, one or more punched card I/O units, one or more line printers, four magnetic tape subsystems, and two single-line communications controls up to a maximum of 10 I/O controls per system.

The B 1776, 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 1776 Processor are as follows: five Type A, three Type B, one Type C, one Type D, one Type E, one Type F, one Type G, and one Type H. 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, one Type G, and one Type H. The optional B 1305 I/O Expansion Feature gives either the B 1726, B 1728, or B 1776 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 or B 1776, and 14 on a B 1728.

The types of I/O controls required by the various I/O units used with the B 1700 systems are as follows:

### Control Type A

9340 Console Printer  
All 80-column card readers  
All 80-column card punches  
9240, 9249 Printers

### Control Type B

All 96-column card readers  
9418 80-column Reader/Punch Data Recorder  
9419 96-column Multi-Purpose Card Unit  
9247 Printers  
Paper tape reader/punches  
MICR reader-sorters  
9490 Cassette Tape Subsystem

### Control Type C

All disk cartridge units

### Control Type D

Single-line communications control

### Control Type E

9499 Dual-Drive Disk Drives  
9495, 9496 Magnetic Tape Units

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➤ performance comparable to that of the earlier B 1714 Processor. The basic B 1705 main memory can be expanded to a maximum of 65K bytes of main memory, and the system can be equipped with any peripheral units currently available for Burroughs B 1710 Processors with the exception of MICR sorter-readers. The new B 1715 Processor includes 32K bytes of main memory and one 1486-1 Disk Pack Control, and can be expanded to up to 65K bytes of main memory. B 1705, B 1707, and B 1709 Processors can be field-upgraded to the B 1715. The B 1717 Processor is a new model that includes a basic 32K bytes of main memory, expandable to a maximum of 131K bytes. Configurations based on the B 1717 can include any available B 1710 peripherals, and can also incorporate an optional I/O Expansion Cabinet Feature, which provides 28 additional I/O Slots.

The B 1713, 1715, 1717, and 1720 systems can execute either Burroughs B 2700/3700/4700 or B 6700/7700 remote job entry software, and can also function as remote job entry terminals to IBM System/360 or System/370 computers by executing the Burroughs HASP Remote Terminal Program.

Enhancements for the larger processor models in the B 1700 Series were released in April 1976 and consist mainly of expanded main memory capacities for both systems. The B 1726 Processor can now include up to 6K bytes of 167-nanosecond control memory and a maximum of 262K bytes of main storage, while the larger B 1728 Processor can be expanded to include a maximum of 8K bytes of 167-nanosecond control memory and a maximum of 393K bytes of main memory. The enhanced B 1728 system includes a new 6-megahertz central processor with 6K bytes of control memory, 65K bytes of main memory, and 8.1 million bytes of head-per-track disk storage, which replaces the earlier B 1728-1 Processor in the B 1700 Series product line.

The B 1776, announced as an entry-level member of the B 1720 family, is the smallest system in the B 1700 Series that is capable of utilizing Burroughs' DMS-II data base management system. It includes a 6-megahertz processor, 2K bytes of control memory, and 49K bytes of main memory. The B 1776 can be field-upgraded to a B 1726 or B 1728.

Technologically, the B 1700 central processors are in tune with the times. They used medium-scale integration (MSI) logic 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 1776, 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

## ➤ Control Type F

All head-per-track disk drives

## Control Type G

9381 Magnetic Tape Units  
9394, 9491 Magnetic Tape Units

## Control Type H

9390, 9391 Magnetic Tape Units

## Control Type J

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. The Multi-Line Communications Control is not available for the B 1776 or any of the smaller systems.

## MASS STORAGE

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

9480-12: dual drives, stores 4,667,120 bytes total.

9481-12: dual drives, stores 9,334,240 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. The two drives are "stacked" so that the unit occupies less than five square feet of floor space. 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 B 1700 Series processor models. A 9480 subsystem consists of a 1480 control and one or two 9480-12 drive units, providing up to four spindles and storing up to 9.3 million bytes on-line. A 9481 subsystem consists of a 1481 control and one or two 9481-12 drive units, providing up to four spindles and storing up to 18.6 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.

**9482-32 DISK CARTRIDGE DRIVE SUBSYSTEM:** A dual disk drive system with removable single-disk cartridges that provides a total storage capacity of 18,660,480 bytes. Each drive accommodates one disk cartridge and has two read/write heads, one serving each recording surface. Comparatively high throughput results from direct movement of the read/write heads from one track to another without first returning to a "home position." Independent seek operation allows the overlapping of head movement on one cartridge drive with any operation on another drive. The 9482-32 uses a 32-bit error detection/correction code. Each drive in the dual-drive unit has its own logic and power supply, and is therefore not dependent on the other drive. Average head positioning time is 35 milliseconds, average rotational delay is 20 milliseconds, and data transfer rate is 387,500 bytes/second.

The 9482-32 Disk Cartridge Drive Subsystem can be used with all B 1700 Series systems. Up to four 9482-32 dual drives can be attached to a B 1700 system, thus providing a maximum data storage capacity of 74,673,920 bytes.

**9484-25 DUAL DISK SUBSYSTEM:** In June 1976, Burroughs announced the 9484-25 and 9484-55 disk pack subsystems. Usable on all B 1700 systems, the 9484-25 subsystem can consist of up to eight spindles with an on

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▷ isolating malfunctioning circuit boards. A novel 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.

### PERIPHERALS

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.

The 9490 Cassette Tape Subsystem can serve as a low-cost alternative to punched cards for use as an input medium and for program storage and file backup. The tape cassettes are interchangeable between the B 1700 computer systems and other Burroughs business systems such as the L 8000 systems, the new B 80, the B 700 systems, the extensive line of TC Series Terminal computers, and the Burroughs Audit Entry computers, one model of which is included in the basic B 1707 Magnetic Entry System.

A family of low-cost disk drives provides 4.6, 9.2, or 18.4 million bytes of data storage on each dual-disk cartridge for B 1705 through B 1713 systems. Larger-capacity disk pack drives are also available for use on the B 1700 systems, and the time tested head-per-track and files can be attached to B 1776, B 1726, and B 1728 systems. A compact 10KB magnetic tape unit plus the Burroughs Magnetic Tape Clusters, which house two, three, or four drives and transfer data at 18K to 36K bytes per second, are available for all of the B 1700 Series systems. The larger B 1720 processor-based systems also can utilize two models of free-standing magnetic tape units rated at 96KB or 120KB. The banking field, where Burroughs has gained a strong position, is served by the specially priced B 1713 MICR Entry System, which includes a 900 document-per-minute MICR reader-sorter that is also available for B 1715 and B 1717 systems. A 1625 document-per-minute MICR reader-sorter can also be used with the B 1700 Series processors.

### DATA COMMUNICATIONS

The data communications capabilities of the B 1700 Series, initially quite limited, received a major boost when Burroughs announced the 1352 Multi-Line Controller (MLC) in July 1973. The MLC gives the B 1726 and B 1728 Processors the welcome capability to handle multiple-line networks. The basic 1352 handles up to 8 lines, and the 1353 MLC Extension permits a total of 32 communications lines to be attached. The B 1705, B 1707, B 1709, B 1713, B 1715, B 1717, and B 1776 systems can use a maximum of two 1351 Single-Line Controllers.

▶ line storage capacity of 62.5 million bytes per spindle. The 9484-25 includes a 1 x 4 Disk Pack Electronics Controller; to achieve a 1 x 8 capability, a 9499-4 Controller Expansion Adapter must be configured with the system. Each 9484-25 Disk Pack Subsystem must include a 1486-1 Disk Pack Control. Average head movement time is 25 milliseconds, average rotational delay is 8.3 milliseconds, and data transfer rate is 605,000 bytes per second.

**9484-55 DUAL DISK SUBSYSTEM:** Usable on all B 1700 systems, the 9484-55 Disk Subsystem has the same requirements and characteristics as the 9484-25 disk subsystem but is a dual-density model with an on-line storage capacity of 130.4 million bytes per spindle.

**9499-7 DUAL DISK STORAGE/CONTROLLER:** Usable only in B 1776, 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 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 added for a maximum subsystem capacity of eight spindles and 697.6 million bytes.

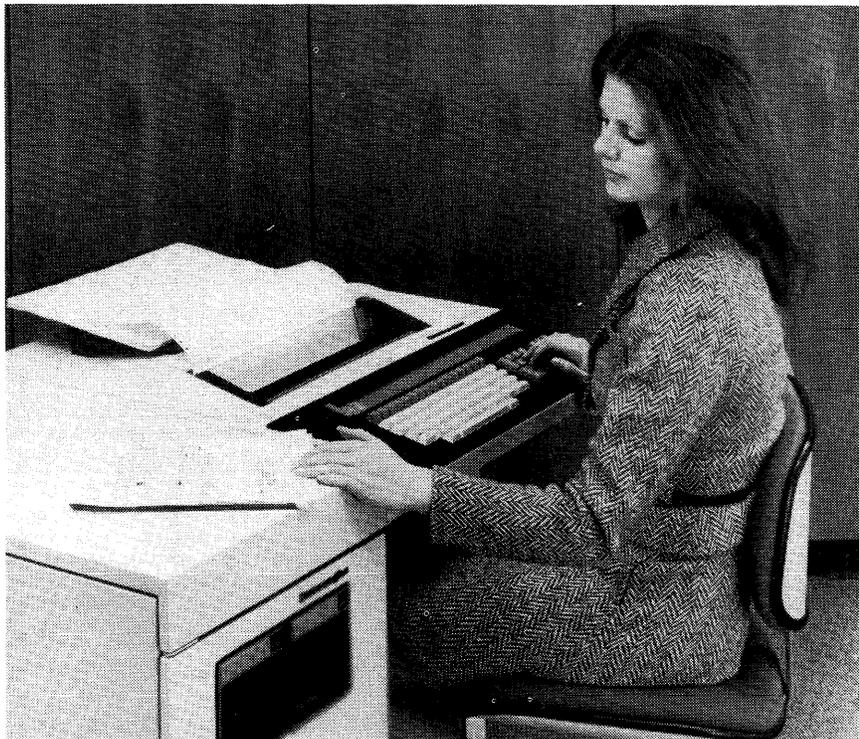
**9499-8 DUAL DISK STORAGE/CONTROLLER:** Usable only in B 1713, B 1715, B 1717, B 1776, B 1726, and B 1728 systems, this disk pack subsystem consists of two spindles of on-line storage with a storage capacity of 43.6 million bytes per spindle. Every 9499-8 must include a 1486-1 Disk Pack Control. Data 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 on all B 1700 systems, 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.

**HEAD-PER-TRACK MEMORY BANKS:** Usable only in B 1776, 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.

## Burroughs B 1700 Series



*The Burroughs AE 501 Audit Entry Data Preparation System is a minicomputer-based unit that functions independently of the B 1700 Series central computer, editing, validating, and capturing ready-to-process data on magnetic tape cassettes for batch transmission to the computer.*

> Thanks to the advent of the MLC, a B 1700 Series system can function either as the central computer in a multiple-line communication 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 provides the Generalized Message Control System (GEMCOS), a parameter-based system which operates user-tailored Message Control Programs, plus the 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. The GEMCOS Message Control Program forms the interface between the network control program and the user programs processing the communications messages.

Remote job entry capabilities are available for B 1700 Series systems through the B 1700 HASP Remote Terminal Product, announced in April 1974. This communications software operates in systems with a minimum of 49K bytes of main memory under control of the MCP operating system, permitting the B 1700 to multiprogram on-site processing with remote job entry to IBM System/360 or System/370 computers operating under the HASP binary synchronous multi-leaving protocol. Thus, the B 1700 becomes a likely candidate for replacing some of the numerous small System/360 and System/3 computers operating as remote batch terminals to larger IBM computer sites.

### ▶ INPUT/OUTPUT UNITS

**AE 306 AUDIT ENTRY SYSTEM:** Announced in 1974 as a data input device for the Burroughs L 6000, L 8000, TC 3500, B 700, and B 1700 computers, the AE 306 is a cassette-oriented minicomputer that edits and captures input data on magnetic tape cassettes and prepares an audit journal of all entered data. The system consists of a minicomputer, 1280 64-bit words of disk memory, an electronic keyboard, a unit printer, and one or two cassette drives. The memory disk has a 15-millisecond average access speed and consists of 40 tracks with a read-write head serving each track. The electronic keyboard includes 16 program select keys, 4 operational control keys, an alphanumeric typewriter keyboard plus 10-key numeric keyboard, and up to 29 operator communication lights. A 32-character keyboard buffer permits keyboard operation to be overlapped with processing and printing. The printer uses an interchangeable 64-character set and prints at 20 characters per second. A 150-position print line is standard, and spacing is 6 lines per inch. A split-platen forms handler can accommodate a variety of forms sizes up to 15½ inches in width. Either a single or dual pin-feed device can be selected. A 32-character print buffer permits printing functions to be overlapped with processing.

One, or optionally two, magnetic tape cassette drives can be included in the AE 306 system for program input and recording of audit data output. The cassette tape station features a variable-speed spindle drive and a dual-gap read/write head with automatic read-after-write verification. Each tape cassette has a usable capacity of 280 feet, with data encoded in NRZI mode at 800 bits per inch in 8-bit ASCII code. Data is recorded in variable-length records, including a one-character preamble, one-character postamble, and two-character cyclic redundancy check. The maximum record length is 256 data characters. Tape cassette operating speeds are 10 inches per second for read/write operations, 30 inches per second for forward or reverse searches, and 60 inches per second during rewind operations.

Operating programs are loaded into system memory either through a photoelectric program loader that reads 100 characters per second or from a cassette reader.

## Burroughs B 1700 Series

▷ Burroughs also provides remote job entry software that permits a B 1700 computer 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 console 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.

### SOFTWARE

All software support for the B 1700 systems is built around the Master Control Program (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 MCP without multiprogramming, MICR, or communications capabilities is available for use on 24K systems). Like the MCP operating systems for the larger Burroughs computers, the B 1700 MCP is 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 most recent releases of the B 1700 MCP, Mark V.0 and Mark V.1, achieve an estimated 10 to 13 percent increase in throughput through the implementation of portions of the operating system in microcode in the central processor. Other enhancements include support for the DMS-II data base management system, disk storage optimization, micro-coded printer-punch backup, a tape sort that can use from three to eight tape units for work files, use of ANSI magnetic tape and cassette labels, emulation under MCP control, and a redesigned queue mechanism.

The B 1700 Series systems, like the large-scale B 6700/7700 Series systems, are 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, 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

▶ A selection of Audit Entry Program Products is available for accounts payable, invoicing and inventory updating, and payroll processing. In addition, a simplified specification sheet for the Burroughs Audit Entry Generator permits user-generated input and output parameters to be processed on a Burroughs medium-scale system to prepare object programs for the AE 306. An L/TC COBOL compiler is also available for program preparation.

**AE 501 AUDIT ENTRY DATA PREPARATION SYSTEM:** The AE 501 was announced by Burroughs in September 1975. Consisting of a processor with up to 28K bytes of semiconductor memory, one or two magnetic tape cassette drives, an electronic keyboard, a serial matrix printer, and one asynchronous or synchronous data communications line, the AE 501 is designed for use with the Burroughs Business Management Systems (BMS) library. The system edits, validates, and captures read-to-process data on magnetic tape cassettes for batch transmission to the computer. Errors are detected and corrected at the point of original entry. The AE 501 simultaneously prints an audit journal to assist the operator and to permit subsequent auditing.

The processor is implemented in large- and medium-scale integrated circuits. Data movement is byte-serial, 8-bit-parallel and is moved one byte at a time from the processor to one of four dedicated I/O channels. One byte of information can be moved within the processor between the processor, the memory, and the I/O channels in 1 microsecond. The memory is modular in 4K-byte increments and consists of 4K bytes of ROM (read-only memory) used for interpreter bootstrap (cold start) and permanent customer confidence programs, plus up to 28K bytes of RAM (random-access memory) available for interpreter and user storage.

Up to two magnetic tape cassette stations can be housed in the AE 501 system. Storage capacity per 300-foot cassette is 204,800 characters. Read/write speed is 10 inches/second, search speed is 30 inches/second, and rewind speed is 60 inches/second. Approximate time to load the full memory capacity is 60 seconds.

The electronic keyboard consists of an alphanumeric typewriter keyboard, a separate 10-key numeric keyboard, and special function keys. The keyboard includes an upper row of 16 Program Select Keys to implement various program options. The unit printer uses an interchangeable 64-character set and prints at 60 characters/second. A 150-position print line is standard, and spacing is 6 lines per inch. The unit is equipped with a single pin-feed device for handling forms from 3 to 16.75 inches wide. It is capable of handling fanfold, single, or multiple-part forms with folds from 3.5 to 12 inches apart.

The AE 501 can communicate in either the asynchronous or synchronous mode with a central computer or another terminal over leased or switched lines, via a Two-wire Direct Interface (TDI) at up to 1000 feet, or via a Burroughs Direct Interface (BDI) at up to 15,000 feet. The line protocols available with the AE 501 include Burroughs Basic Mode, Point-to-Point Batch, and the new bit-oriented Burroughs Data Link Control procedures.

**9348-32 TD 800 CONSOLE DISPLAY:** In June 1976, Burroughs announced the 9348-32 TD 800 Console Display, an optional unit for use with all B 1700 systems. The 9348-32 is cable-connected and can be located up to 50 feet away from the B 1700 processor. The unit has a screen capacity of 1920 characters displayed in 24 80-character lines, and features automatic display of active job mix and status, the jobs in the schedule, system resource allocation, and scrolling for log history. The 9348-32 can be used with the 1352-2 Wideband Adapter for binary synchronous transmission of data at 19,000 or 50,000 bits per second, or with the 1667-2 BDI adapter, which allows direct connection of terminals up to 15,000 feet away and can be used with either single-line or multi-line controls.

**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

## Burroughs B 1700 Series

➤ get a B 1700 system into productive operation for many users in manufacturing, wholesaling, distribution, banking, utilities, hospitals, government agencies, schools, and motor freight companies. In addition, Burroughs will, for a fee, provide all the support required to install and maintain a system.

## COMPATIBILITY AND COMPETITION

Integrated Interpreters, which operate under control of the MCP operating system, are available for IBM 1401/1440/1460, IBM 1130, and Burroughs' own B 100/200/300/500 Series computers. Program compatibility with other computers is 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) routines.

The new small-scale B 1700 systems, with their attractively priced packaged configurations, are designed to compete against the IBM System/3 Model 8, Honeywell Model 61/60, and other small-scale, entry-level computer systems. Within this class, the B 1700 systems rank at or near the top in technology. The larger B 1726, B 1728, and B 1776 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 Level 62 and Level 64 Processors—and even in this fast company, the sophisticated software, advanced technology, and user-oriented design of the Burroughs systems make them thoroughly competitive.

## USER REACTION

Datapro contacted 10 users of B 1700 systems, selected randomly from a list of about 100 supplied by Burroughs, and talked to them regarding their experience with the systems. These users had a total of 17 of the B 1700 systems installed; two B 1714's, one B 1716, and fourteen B 1726's. The average length of time installed for all of these systems was 19 months.

Five of these users had replaced other manufacturers' systems with the Burroughs units, four had upgraded from other Burroughs systems, and one had no system prior to installing the Burroughs unit. All of the users leased their systems, and all were performing business data processing operations. Four users were involved in data communications activity to some extent, using Burroughs' Network Definition Language (NDL). All of the users were using the MCP II operating system.

The 10 B 1700 users supplied the following ratings for their systems in 12 important performance categories:

capacity of up to 861 256-byte records. The data transfer rate is 1,000 bytes per second. Available for all B 1700 Series 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 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 any B 1700 Series system:

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 1700 systems. Four of these can be used only with the B 1776, B 1726, and B 1728, while the other two (the 9496-2 and 9496-4) can be used in any B 1700 system. 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 photoelectrically, 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 above. Usable with any B 1700 Series system.

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	Excellent	Good	Fair	Poor	WA*
Ease of operation	10	0	0	0	4.0
Reliability of mainframe	8	2	0	0	3.8
Reliability of peripherals	2	6	2	0	3.0
Maintenance service:					
Responsiveness	8	2	0	0	3.8
Effectiveness	5	5	0	0	3.5
Technical support	1	5	2	0	2.9
Operating system	10	0	0	0	4.0
Compilers and assemblers	5	3	1	0	3.4
Application programs	1	1	0	0	3.5
Ease of programming	5	5	0	0	3.5
Ease of conversion	6	2	0	0	3.8
Overall satisfaction	7	3	0	0	3.7

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

These B 1700 users were greatly impressed by the systems' ease of operation, as indicated by the perfect score of 4.0 they assigned in this category. In two related areas, ease of programming and ease of conversion, the B 1700 Series systems also fared extremely well, earning weighted average ratings of 3.5 and 3.8, respectively, in these important user-oriented performance categories. One user called the B 1700 Series "the easiest damn system in the world to use." This user had seven B 1726 systems installed in sales offices around the country, and all were being run by sales personnel, trained in what he described as "a minimal amount of time."

Software was another area which these B 1700 users were enthusiastic about, assigning weighted averages of 4.0 to the operating system (MCP II in all cases) and 3.4 to the compilers and assemblers. These users made comments such as "state of the art," "four star," and "better than excellent" when expressing their opinion of MCP II. Several users were very impressed with the file handling capabilities of the operating system. Only two of the users we contacted were using any of Burroughs' application programs, and both seemed well satisfied with them.

The Burroughs technical support and the reliability of the B 1700 peripherals were the aspects of the systems that least impressed these users. Eight of the ten users we contacted rated the technical support category, while two declined on the basis that they had never solicited help of this nature from Burroughs. One user complained that the "tech support people take too long getting back to us." Another offered a similar comment and added that he felt that the technical support personnel were "spread too thin," and that there was "not a lot of communication between the tech reps and the CE's."

When questioned about the reliability of the peripherals, three of the 10 users mentioned dissatisfaction with the cartridge disk subsystems. Two of these users had replaced them with removable disk pack units, and the third was in the process of doing so. Both of the users who had converted to the disk pack units were very satisfied with them at this point.

The 3.7 rating for overall satisfaction assigned by these users speaks well for the B 1700 Series systems. ➤

➤ **9117 CARD READER:** Reads up to 800 cpm. Otherwise, has the same characteristics as the B 9115 described above. Usable with any B 1700 Series system.

**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 with any B 1700 Series system.

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

**B 9212 CARD PUNCH:** Punches standard 80-column cards at up to 150 cards per minute. Available for B 1776, B 1726, and B 1728 systems.

**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. Available for B 1776, 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 1000 cpm. Usable with any B 1700 Series system.

**9418-2 CARD READER PUNCH/DATA RECORDER:** Reads 80-column cards at 200 cpm, and punches and/or prints full cards at 45 cpm; high 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 unit features a 64-character movable keyboard, 64-character printing, a full 80-column print line, and 80-column read, punch, and print buffers. Usable with any B 1700 Series system.

**9419-2 CARD READER PUNCH/DATA RECORDER:** 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, and the unit features a keyboard that permits off-line use as a 96-column keypunch or verifier. Program storage for four format-control programs is included. 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.

**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 ➤

## Burroughs B 1700 Series

Comments such as "98 percent uptime," "seven months with only one day of downtime," "can't knock it—only a few hours a month downtime," and "very few problems" reflect the general feeling among these users. If these strongly positive user reactions are representative of the feelings of other users, the B 1700 Series, with its advanced design concepts and sophisticated software, should continue to be a strong competitor in the small-scale computer marketplace. □

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 9120 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.

**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.

**LINE PRINTERS:** Burroughs offers printers that span a range of printing speeds from 85 to 1100 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 1705, B 1707, B 1709, B 1713, B 1715, and B 1717 systems).
- 9249-2: 160-lpm Chain Printer (for B 1705, B 1707, B 1709, B 1713, B 1715, and B 1717 systems).
- 9249-3: 250-lpm Chain Printer (for any B 1700 Series system).
- 9240-3: 1040-lpm Drum Printer (for B 1776, B 1726, and B 1728 systems).
- 9247-12: 400-lpm Train Printer (for any B 1700 Series system).
- 9247-13: 750-lpm Train Printer (for any B 1700 Series system).
- 9247-14: 1100-lpm Train Printer (for any B 1700 Series system).

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 alphabets. The 9247 Train Printers 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 includes the B 9135-2 MICR Reader-Sorter in the packaged B 1713 MICR Entry Computer System. The B 9134-1 and B 9135-1 MICR Reader-Sorters are available for all B 1700 systems, and the B 9137 Reader-Sorter is available for B 1776, B 1726, and B 1728 systems. These reader-sorters have the following characteristics:

- 9135-2: 900 dpm, 8 stacker pockets.
- 9135-3: 900 dpm, 12 stacker pockets.
- 9134-1: 1625 dpm, 4, 8, 12, or 16 stacker pockets.
- 9137-1: 1625 dpm, 4, 8, 12, or 16 stacker pockets; has "double read" capability to reduce the number of reject items.

The 9135 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 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 and 9137-1 are high-performance units that can be equipped with a variety of optional features, including a numeric optical character recognition feature. In addition, the 9137-1 is equipped with a double read capability so that MICR characters are read twice during each pass by two separate read heads. The first read is called a "deep" read, in which an attempt is made to interpret imperfect characters, and the second is a "shallow" read which is capable of reading perfect MICR characters.

## COMMUNICATIONS CONTROL

**1351 SINGLE-LINE CONTROL:** Provides the interface between a single leased or switched communications line and a B 1705, B 1707, B 1709, B 1713, B 1715, B 1717, B 1776, B 1726, or B 1728 Processor. The maximum number of single-line controls that can be connected to a B 1700 Series processor is two. 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.

**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 (10) controls data communications devices and MICR reader-sorters.

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► **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 24K bytes at present.

MCP I runs on any B 1700 Series processor equipped with at least 24K 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. The total memory residence requirement for MCP I is 16K bytes.

The most recent release of MCP II is Release 5.1, which provides an estimated 10 to 13 percent improvement in throughput. This performance improvement has been achieved by incorporating operating system routines into the central processor microcode. Release 5.1 also includes the capability to run concurrently the HASP Remote Terminal Program for remote job entry and communications programs programmed in the Network Definition Language, and includes support for the DMS-II data base management system for B 1776, B 1726, and B 1728 systems.

Other recent enhancements to the MCP include a newly coded printer/punch backup facility, a storage compaction program for direct-access storage devices, ASCII labels for magnetic tapes and cassettes, emulation under MCP control, and an improved input queue design.

**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 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.

Recent enhancements to B 1700 COBOL include a new queue handling technique and a new sort capability that includes a tag search, a restart facility, vertical collating sequence, and tape sorting.

**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 limitations 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 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 II. 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 DMS-II. 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. Numerous 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 any B 1700 Series 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 any B 1700 Series system with at least 40K bytes of main memory.

**GENERALIZED MESSAGE CONTROL SYSTEM (GEMCOS):** GEMCOS is a generalized system that uses parameters for generating installation-tailored Message Control Programs. The Message Control Program provides the interface between the network controller and user application programs by decoding and directing incoming messages to the appropriate user program for processing. The system can accommodate user-written code and contains facilities for exchange of data between application programs. Recovery capabilities include dynamic restoration of the network configuration, an audit mechanism for logging specified messages, and a network control command for orderly system shutdown in the event

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► of system failure. A password security system is provided to control access to the communications network. The system also includes an auxiliary program to permit network commands to be entered into the MCS from the console printer or a card reader.

GEMCOS requires a minimum of 24K bytes of main memory for Message Control Program generation (not including MCP and Network Definition Language memory requirements), plus a console printer, card reader, line printer and 4.6 million bytes of disk storage, exclusive of MCP and NDL requirements.

**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.

**DATA MANAGEMENT SYSTEM II (DMS-II):** Announced in October 1974 for the large-scale Burroughs B 6700 and B 7700 systems, Burroughs' integrated data base management system was released for the B 1700 system early in 1976 for operation under Release 5.0 of the MCP II operating system. It has also been released for the medium-scale B 2700/3700/4700 and B 2800/3800/4800 systems.

The B 1700 version of DMS-II consists of two components, a Data and Structure Definition Language (DASDL) which provides for the logical description of data sets or subsets and for mapping the logical data onto physical structures, and a COBOL interface. Burroughs' DMS-II is described in detail in DATAPRO 70 Report 70E-112-01.

Specifically, B 1700 DMS-II is a logical subset of B 6700 DMS-II. The COBOL constructs used in B 1700 Series COBOL programs for accessing the data base are syntactically and semantically compatible with those used in B 6700 COBOL. However, the physical mapping algorithms for structuring the data base records on direct-access storage differ, so that a B 1700 DMS-II data base must be remapped and reloaded before being transferred to B 6700 DMS-II. The B 1700 DMS-II DASDL parameters are also incompatible with B 6700 DMS-II DASDL statements. However, DMS statements in COBOL programs are compatible with B 6700 DMS-II, eliminating the necessity of converting DMS-II COBOL user programs.

**B 1700 DATA ENTRY SYSTEM:** Released for the B 1709 Direct Data Entry System, the Data Entry System software permits data entry and creation of data files using from one to eight Burroughs TD 701 CRT terminals. The system includes a basic Screen File for user-created screen formats; up to 11 groups of screen formats (called applications) are permitted, each of which can contain up to 99 screen formats. The system also includes a record reformatting utility that permits modification of the order of data items within a record after the record has been entered into the system. The utility can also be used for entering data with signed fields.

The Data Entry System includes an interface to user-written update or inquiry programs using two MCP queues. One user-written program can execute concurrently with data entry operations. The minimum system requirements are a B 1700 system with 49K bytes of main memory, 4.6 million bytes of disk cartridge storage, up to eight TD 701 CRT terminals, a line printer, and a single-line communications control. The Data Entry System is a separately priced program product.

**B 1700 TEXT/EDITOR (TEI):** This remote text editing program runs under control of the MCP operating system and provides facilities for source file maintenance

operations concurrently with batch and other remote processing. The system provides a conversational English-language command language which includes editing, manipulation, and control commands that can be entered from TD 700 or TD 800 series remote terminals. Each terminal user is provided with a re-entrant copy of the Text/Editor program in order to insure effective response. Text/Editor requires a B 1700 Series system with 49K bytes of main memory, a disk storage subsystem, console printer, and one TD 701, TD 801, TD 802, TD 821, or TD 822 terminal. The minimum 49K system supports the execution of two copies of Text/Editor executing on two TD 701 terminals attached to one single-line communications control.

**HASP REMOTE TERMINAL PROGRAM:** Permits a B 1700 Series 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 1700 Series 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.

**B 100/200/300/500 EMULATOR:** This emulator enables any B 1700 Series system to execute object programs written for the popular second-generation Burroughs B 100, 200, 300, or 500 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 6-tape lists, 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 any B 1700 Series system 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 1401/1440/1460 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 require a B 1726 or B 1728 system with a 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.

**CONVERSION AIDS:** In addition to emulators, Burroughs offers the following language translators as aids for ►

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- converting from competitive computer systems: Honeywell Easycode to B 1700 COBOL, NCR Century Series COBOL to B 1700 COBOL, IBM Autocoder to B 1700 COBOL, NCR NEAT/3 to B 1700 COBOL, and Honeywell COBOL to B 1700 COBOL.

**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 options. 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.

**APPLICATION PROGRAMS:** The following applications programs are available for B 1700 Series systems:

### Business Management System

- Accounts Receivable
- Accounts Payable
- Payroll
- General Ledger

### Bank Management System

- Demand Deposit Accounting
- Proof and Transit Savings
- Installment Loans
- Certificate of Deposit
- General Ledger
- COS Reporting Module
- CIS On-Line Inquiry
- CIS On-Line Update
- Commercial Loans

### Hospital Management System

- Patient Accounting
- General Ledger
- Medical Records
- Payroll
- Accounts Payable

### Utility Management System

- Utility Business Management System
- Utility Billing System

### Local Government Utility Management System

- Local Government and Utility Management System
- Local Government Management System
- Municipal Budgetary System

### Auto Dealer Management System

- Auto Dealer System
- General Accounting
- Payroll
- Parts Inventory
- Leasing

### Scholastic

- Test Scorer
- Scheduling
- Financial System
- Student Record
- Payroll

### Motor Freight

- General Ledger and Reporting System
- Vehicle Maintenance and Asset Control
- Accounts Receivable and Freight
- Payroll
- Accounts Payable

### Contractor Management System

- Contractor System
- Payroll and Labor Cost
- Accounts Payable
- Equipment Cost
- Job Cost Reporting
- General Ledger

### Hotel Back Office Business Management System

- Hotel System
- Accounts Payable
- City Ledger
- General Ledger
- Payroll

### Production Control System (B 1720 only)

- Engineering Data Control Module
- Inventory Control Module
- Requirements Planning Module
- Work In Process Module
- On-Line Inquiry Module
- On-Line File Maintenance Module
- Capacity Requirements Planning Module
- Forecasting and Inventory Analyses Module

### On-Line Wholesale Distribution System (B 1717 and B 1720-class systems only)

- Order Entry
- Warehouse Picking Lists
- Multiple Scheduled Shipments
- Backorder Processing
- Invoicing
- Inventory Updating and Reporting
- Open Items Accounts Receivable
- Customer Accounts Receivable Statements
- Aged Trial Balance
- Sales Analysis
- On-Line Inquiry

## PRICING

**EQUIPMENT:** The following systems are representative of the types of B 1720-class systems that are likely to be commonly installed and are supported by the standard Burroughs software. Prices for the packaged B 1710-class systems are shown in the Equipment Prices section at the end of this report. In the configurations that follow, 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.

**TYPICAL B 1776 SYSTEM:** Consists of 81K B 1776 Central Processor, console printer, 96-column card reader punch/data recorder, 400-lpm printer, dual-disk storage/controller (174.4 million bytes), and single-line control. Monthly rental and purchase prices are approximately \$5,200 and \$198,000, respectively.

**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 \$4,700 and \$186,800, 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 approximately \$10,200 and \$416,900, 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

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► 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 System 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 1710-class 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 1720-class 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.

**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.■

## EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
<b>PROCESSORS AND MAIN STORAGE</b>				
B 1705	Basic System; includes Central Processor with 24K bytes of main memory	22,225	129.00	735
B 1707	Magnetic Entry System; includes Central Processor, 24K bytes of main memory, A 9340 Console and Control, A 9480-12 Disk and Control (4.6 MB), A 9219-2 Printer (160 lpm), A 9490-25 Tape Cassette and Control, and AE 306 Audit Entry Station	72,900	437.00	1,950
Memory Options for B 1705 and B 1707 Systems:				
B 1010-32	32K bytes total memory	3,000	11.90	76
B 1010-40	40K bytes total memory	6,000	19.00	152
B 1010-48	48K bytes total memory	9,000	26.20	228
B 1010-56	56K bytes total memory	12,000	33.40	304
B 1010-64	65K bytes total memory	15,000	41.70	380
B 1709	Direct Data Entry System; provides Central Processor, 48K bytes of memory, A 9340 Console and Control, A 9480-12 Disk and Control (4.6 MB), A 9249 Printer and Control (160 lpm), A 1351 Single-Line Control and A 1650-7 Adapter (9600 bps), two TD 701 Input/Display Stations, two TD 012-1 Keyboards, two TD 023 Interfaces, two TD 031 Poll and Select Options, two TD 052 Extended Memory Features, and two TD 056 Cables	77,900	384.00	2,225
Memory Options for B 1709:				
B 1011-56	56K bytes total memory	3,000	11.90	76
B 1011-65	65K bytes total memory	6,000	19.00	152
B 1713	MICR Entry System; includes Central Processor, 48K bytes of main memory, A 9340 Console and Control, A 9115 Card Reader and Control (300 cpm), A 9249-3 Printer and Control (250 lpm), A 9480-12 Disk and Control (4.6 MB), A 9135 Reader Sorter and Control, and A 1351 Single-Line Control	127,900	985.00	3,083
Memory Options for B 1713:				
B 1011-56	56K total memory	3,000	11.90	76
B 1011-65	65K total memory	6,000	19.00	152
B 1715	Mass Storage System; includes Central Processor, 32K bytes of memory, and A 1486-1 Disk Pack Control	53,200	176.00	1,420
Memory Options for B 1715:				
B 1015-40	40K bytes total memory	3,000	11.90	76
B 1015-48	48K bytes total memory	6,000	19.00	152
B 1015-56	56K bytes total memory	9,000	26.20	228
B 1015-64	64K bytes total memory	12,000	33.40	304
Processor Upgrades:				
B 1705 to B 1715	Processor Upgrade	22,000	—	700
B 1707 to B 1715	Processor Upgrade	22,000	—	700
B 1709 to B 1715	Processor Upgrade	19,000	—	440

\*Rental prices include equipment maintenance.

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EQUIPMENT PRICES

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>Rental (1-year lease)*</u>
<b>PROCESSORS AND MAIN STORAGE (Continued)</b>				
B 1717	Extended Memory System; includes Central Processor and 32K bytes of memory I/O Expansion Cabinet for B 1717; includes 28 additional I/O card slots	57,900 12,000	135.00 60.00	1,615 300
Memory Options for B 1717:				
B 1017-40	40K bytes total memory	3,000	11.90	76
B 1017-48	48K bytes total memory	6,000	19.00	152
B 1017-56	56K bytes total memory	9,000	26.20	228
B 1017-64	64K bytes total memory	12,000	33.40	304
B 1017-80	80K bytes total memory	18,000	41.70	456
B 1017-96	96K bytes total memory	24,000	55.40	608
B 1017-112	112K bytes total memory	30,000	70.80	760
B 1017-128	128K bytes total memory	36,000	86.30	912
B 1776	Includes Central Processor with 48K bytes of Control Memory, and console and table	90,000	192.00	2,200
Memory Options for B 1776 Systems:				
	56K bytes total memory	3,000	11.90	76
	64K bytes total memory	6,000	19.00	152
	80K bytes total memory	12,000	26.20	304
	96K bytes total memory	18,000	41.70	456
	112K bytes total memory	24,000	70.80	608
	128K bytes total memory	30,000	86.30	760
B 1726	Processor with 24K bytes of main memory, 2K bytes of Control Memory, and console and table	87,300	166.00	1,959
Memory Options for B 1726 Processor:				
B 1026-32	32K Bytes Total Memory	3,000	11.90	86
B 1026-40	40K Bytes Total Memory	6,000	19.00	207
B 1026-49	49K Bytes Total Memory	9,000	26.20	328
B 1026-57	57K Bytes Total Memory	12,000	33.40	464
B 1026-65	65K Bytes Total Memory	15,000	41.70	615
B 1026-81	81K Bytes Total Memory	21,000	56.10	816
B 1026-98	98K Bytes Total Memory	27,000	71.50	818
B 1026-131	131K Bytes Total Memory	39,000	102.00	1,222
B 1728	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	495.00	4,082
Memory Options for B 1728 Processor:				
B 1028-81	81,920 Bytes Total Memory	6,000	14.30	252
B 1028-98	98,304 Bytes Total Memory	12,000	29.80	453
B 1028-114	114,688 Bytes Total Memory	18,000	44.10	655
B 1028-131	131,072 Bytes Total Memory	30,000	58.40	857
B 1028-147	147,456 Bytes Total Memory	36,000	72.70	1,058
B 1028-163	163,840 Bytes Total Memory	40,000	86.90	1,260
B 1028-180	180,224 Bytes Total Memory	46,000	101.00	1,462
B 1028-196	196,608 Bytes Total Memory	50,000	116.00	1,663
B 1028-212	212,992 Bytes Total Memory	56,000	130.00	1,865
B 1028-229	229,376 Bytes Total Memory	60,000	144.00	2,066
B 1028-245	245,760 Bytes Total Memory	66,000	159.00	2,268
B 1028-262	262,144 Bytes Total Memory	70,000	173.00	2,470
Processor Options:				
A/B 1305	I/O Expansion Feature (for all processors)	1,500	6.00	31
A/B 9340	Console Printer	2,750	19.30	58
A/B 1340	Console Printer Control	2,230	6.00	61
B 1026-2	2,048 Bytes Additional Control Memory (for B 1726)	17,600	35.70	404
B 1028-2	2,048 Bytes Additional Control Memory (for B 1728)	17,600	35.70	404
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	17.90	227
A/B 9348-32	TD 800 Console Display	6,460	28.60	140
A/B 1348-32	Control for TD 800 Display	2,400	9.60	60
A/B 1352-2	Wideband Adapter	11,500	41.70	260
A/B 1667-2	BDI Adapter	2,400	9.60	60
<b>MASS STORAGE</b>				
A/B 9480-12	Dual Disk Cartridge Drive; 4.6 million bytes	11,900	58.50	342
A/B 9481-12	Dual Disk Cartridge Drive; 9.2 million bytes	14,900	79.40	502
A/B 1480	Control for 9480-12 Drives	4,665	17.90	99
A/B 1481	Control for 9481-12 Drives	4,665	17.90	102
A/B 9484-25	Dual Disk Storage/Controller; 65.2 million bytes	34,000	177.00	850
A/B 9484-55	Dual Disk Storage/Controller; 130.4 million bytes	42,000	177.00	1,050
A/B 9484-2	Dual Drive Increment; 65.2 million bytes	27,900	140.40	695
A/B 9484-5	Dual Drive Increment; 130.4 million bytes	31,150	140.40	770
A/B 9499-4	Controller Expansion Feature; 1 x 8	2,000	1.50	70
A/B 1486-1	Host Control	11,200	41.70	260
B 9499-7	Dual Disk Storage/Controller; 174.4 million bytes	49,250	291.00	1,397
A/B 9499-8	Dual Disk Storage/Controller; 87.2 million bytes	38,000	269.00	932
B 9499-9	Controller Expansion Adapter; provides 1 x 8 capability for B 9499-7	2,420	5.70	57
B 9486-45	Single Disk Pack Drive Add-On Increment for B 9499-7; 87.2 million bytes	32,500	129.00	732

\* Rental prices include equipment maintenance.

## Burroughs B 1700 Series

## EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
<b>MASS STORAGE (Continued)</b>				
B 9486-4	Dual Disk Pack Drive Add-On Increment for B 9499-7; 175 million bytes total	36,250	211.00	968
A/B 1486-1	Disk Pack Control for B 9499-7 and B 9499-8 drives	11,200	171.00	260
A 9370-3	Head-per-Track Systems Memory; 1.9 million bytes	21,450	109.00	600
B 9371-7	Head-per-Track Memory Bank; 8.1 million bytes	28,800	239.00	633
B 9371-14	Head-per-Track Memory Bank; 14 million bytes	36,000	251.00	787
B 9374-17	8.1-Million-Byte Add-On Unit for B 9371-7	19,200	140.00	420
B 9374-10	14-Million-Byte Add-On Unit for B 9371-14	26,400	112.00	569
B 1374	Control for Head-per-Track Memory Banks	9,600	14.30	202
B 1674-1	1 x 2 Head-per-Track Adapter	1,980	8.40	46
B 1674-2	2 x n Head-per-Track Exchange	1,760	6.00	41
<b>MAGNETIC TAPE EQUIPMENT</b>				
A/B 9381-12	Magnetic Tape Cluster; 18KB, 2 stations	26,085	213.00	550
A/B 9381-13	Magnetic Tape Cluster; 18KB, 3 stations	27,905	239.00	596
A/B 9381-14	Magnetic Tape Cluster; 18KB, 4 stations	33,290	287.00	711
A/B 9381-22	Magnetic Tape Cluster; 36KB, 2 stations	34,780	244.00	732
A/B 9381-23	Magnetic Tape Cluster; 36KB, 3 stations	44,715	281.00	941
A/B 9381-24	Magnetic Tape Cluster; 36KB, 4 stations	54,650	318.00	1,150
A 1381	Magnetic Tape Cluster Control	6,000	45.30	255
B 1381	Magnetic Tape Cluster Control	6,960	45.30	255
A/B 9491-2	Magnetic Tape Unit; 10KB, 9 Tracks	8,900	25.10	226
A 1491-2	10KB Tape Control	3,900	10.50	204
B 1491	10KB Tape Control	10,368	35.70	220
B 9390	Magnetic Tape Unit; 18/50KC, 7 tracks	15,860	177.00	333
B 9391	Magnetic Tape Unit; 18/50/72KC, 7 tracks	18,000	201.00	379
B 9394-2	Magnetic Tape Unit; 96KB, 9 tracks	21,115	207.00	440
B 1390	Magnetic Tape Control; 18/50/72KC, 7 tracks	6,960	45.30	255
B 1394-2	Magnetic Tape Control; 96KB, 9 tracks	12,300	47.60	305
A/B 9496-2	Magnetic Tape Unit; 40KB, 9 tracks	11,500	77.40	283
A/B 9496-4	Magnetic Tape Unit; 80KB, 9 tracks	13,770	82.20	357
A/B 1496-4	Magnetic Tape Control; 40/80KB, 9 tracks (B 1776/1726/1728; requires B 9499-30 or -31)	13,500	63.20	336
A/B 9499-30	Master Electronic Exchange; 1 x 4 (for B 1496-4)	4,950	23.90	131
A/B 9499-31	Master Electronic Exchange; 1 x 8 (for B 1496-4)	8,000	23.90	209
B 9499-32	Master Electronic Exchange; 2 x 8 (for B 1496-4)	11,900	51.30	314
B 9495-2	Magnetic Tape Unit; 120KB, 9 tracks	14,990	88.10	440
B 1495-2	Magnetic Tape Control; 120KB, 9 tracks (requires B 9499-10 or -11)	16,520	63.20	476
B 9499-10	Master Electronic Exchange; 1 x 4 (for B 1495-2)	5,700	24.90	145
B 9499-11	Master Electronic Exchange; 1 x 8 (for B 1495-2)	8,200	24.90	207
A/B 9490-25	Magnetic Tape Cassette	1,640	7.70	55
A/B 1490-25	Control for A 9490-25	4,400	33.10	129
<b>80-COLUMN CARD EQUIPMENT</b>				
A/B 9119-2	Card Reader; 1000 cpm	9,940	59.50	231
B 9111	Card Reader; 800 cpm	18,165	107.00	384
B 9112	Card Reader; 1400 cpm	24,145	162.00	532
A/B 9115	Card Reader; 300 cpm	5,075	34.10	135
A/B 9116	Card Reader; 600 cpm	7,135	47.70	213
A/B 9117	Card Reader; 800 cpm	9,875	58.50	274
A/B 9418	Card Reader/Punch; 200/45 cpm	1,206	25.10	321
A 1115	Control for A 9115 Reader	1,200	8.80	55
B 1111	Control for B 9111 & 9112 Readers	2,332	8.40	49
A/B 1115	Control for B 9115, 9116, & 9117 Readers	2,160	9.50	46
B 9917	Card Counter (for B 9111 & 9112)	250	—	6
B 9918	Postal Money Order Feature (for B 9111 & 9112)	1,490	6.50	32
B 9919	40-Column Read Switch (for B 9111 & 9112)	240	—	—
A 9210-1	Card Punch; 100 cpm	12,700	83.60	265
A 1210-1	Control for A 9210-1 Punch	4,320	16.60	90
B 9212	Card Punch; 150 cpm	22,635	135.00	472
B 9213	Card Punch; 300 cpm	27,905	173.00	582
B 1213	Control for B 9212 and B 9213 Punch	4,320	16.60	92
<b>96-COLUMN CARD EQUIPMENT</b>				
A/B 9119-1	Card Reader; 300 cpm	3,840	29.80	98
A/B 9119-2	Card Reader; 1000 cpm	9,940	59.50	231
A/B 9419-2	Card Reader/Punch/Data Recorder; reads 300 cpm, punches 60 cpm	10,410	84.60	274
A/B 9419-6	Multi-Purpose Card Unit; reads 300 cpm, punches 60 cpm, sorts 300 cpm, prints 60 cpm	12,500	101.00	326
A/B 1119	Control for B 9119-1	2,332	8.40	49
A/B 1119-2	Control for B 9119-2	4,500	15.40	102
A/B 1419	Control for B 9419-2 & 9419-6	2,332	13.20	77
<b>PAPER TAPE EQUIPMENT</b>				
A/B 1120	Paper Tape Reader Control	1,800	10.80	51

\* Rental prices include equipment maintenance.

## Burroughs B 1700 Series

### EQUIPMENT PRICES

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>Rental (1-year lease)*</u>
<b>PAPER TAPE EQUIPMENT (Continued)</b>				
A/B 9120	Paper Tape Reader; 500/1000 char/sec.	16,560	90.10	314
A/B 9926	Input Translator for B 9120	7,200	12.90	152
B 1220	Paper Tape Punch Control	2,100	22.70	63
B 9220	Paper Tape Punch; 100 char/sec.	15,840	83.60	272
B 9928	Output Translator for B 9220	7,090	12.90	137
<b>LINE PRINTERS</b>				
A/B 9247-12	Train Printer; 400 lpm, 120 positions	21,550	150.00	613
A/B 9247-3	Train Printer; 750 lpm, 120 positions	34,050	204.00	849
A/B 9247-14	Train Printer; 1100 lpm, 132 positions	43,550	289.00	1,150
A 9249-1	Printer; 85 lpm, 132 positions	8,500	71.50	243
A 9249-2	Printer; 160 lpm, 132 positions	9,900	83.40	283
A/B 9249-3	Printer; 250 lpm, 132 positions	13,400	112.00	392
B 9240-3	Printer; 1040 lpm, 132 positions	45,025	252.00	941
A/B 9247-13	Train Printer; 750 lpm, 120 positions	35,000	204.00	935
A 1249-1	Control for A 9249-1 Printer	1,000	5.60	36
A 1249-2	Control for A 9249-2 Printer	1,100	6.60	41
A/B 1247-4	Control for B 9247-14 Train Printer	5,400	23.90	123
B 1240	Control for B 9240-3 Printer	2,880	10.80	62
A/B 1247	Control for B 9247-3, -12, -13 Train Printers	4,320	16.60	92
B 1249-3	Control for B 9249-3 Printer	1,300	8.40	46
B 9942-9	Additional Train Module for B 9247-3, -12, -13 Train Printers	3,500	21.40	68
B 9949-10	Additional Train Module for B 9247-14 Train Printer	3,150	21.40	99
<b>MICR READER-SORTERS</b>				
A/B 9135-2	Reader-Sorter; 900 dpm, 8 pockets	48,230	514.00	1,097
A/B 9135-3	Reader-Sorter; 900 dpm, 12 pockets	59,250	556.00	1,428
A/B 9134-1	Reader-Sorter; 1625 dpm, 4 pockets	49,200	418.00	1,072
B 9137	Reader-Sorter; 1625 dpm, 4 pockets	50,000	418.00	1,139
A 1135	Control for A 9135-2 & 9135-3	6,000	35.70	154
B 1135	Control for B 9135-2 & 9135-3	6,480	35.70	204
A/B 1130	Control for A/B 9134, A/B 9135	6,480	35.70	204
A/B 1134	Control for B 9134-1	6,480	35.70	204
B 9932	Endorser (for A 9135)	9,000	64.30	209
B 9933-4	Extended Sort Control (for B 9134-1)	2,400	19.30	53
B 9935-2	Four-Pocket Module (for B 9134-1)	14,400	45.00	314
B 9935-3	Four-Pocket Module (pockets 17-32 on 9134-1; requires B 9935-1)	14,400	45.00	314
B 9935-1	Expansion Feature (for over 16 pockets on B 9134-1)	4,800	12.90	105
B 9938-1	Multi-Track E-13B Read (for B 9134-1)	18,000	70.70	392
B 9938-6	Numeric OCR A Optical character Recognition System (for B 9134-1)	46,000	152.00	1,045
<b>COMMUNICATIONS CONTROLS</b>				
A/B 1351	Single-Line Control	2,000	9.50	51
B 1352	Multi-Line Controller	13,000	33.40	204
B 1353	Multi-Line Controller Extension	6,750	25.10	153
<b>Data Communications Line Adapters:</b>				
A/B 1650-1	Asynchronous Data Set Connect, up to 1200 bps	1,500	9.50	51
A/B 1650-2	Asynchronous Data Set Connect, up to 1800 bps	1,800	11.90	66
A/B 1650-5	Asynchronous Direct-Connect, up to 2400 bps	1,500	9.50	51
A/B 1650-6	Asynchronous Direct-Connect, up to 4800 bps	1,800	11.90	66
A/B 1650-7	Asynchronous Direct-Connect, up to 9600 bps	2,100	14.30	82
A/B 1651-1	Synchronous Data Set Connect, up to 2400 bps	1,500	9.50	51
A/B 1651-2	Synchronous Data Set Connect, up to 4800 bps	1,800	11.90	66
A/B 1651-3	Synchronous Data Set Connect, up to 9600 bps	2,100	14.30	82
A/B 1652-1	Asynchronous Data Set Connect for Teletypewriters	1,500	9.50	51
A/B 1652-5	Asynchronous Data Set Connect for Teletypewriters	1,500	9.50	51
B 1653-1	Binary Synchronous Data Set Connect, up to 2400 bps	8,800	38.10	204
B 1653-2	Binary Synchronous Data Set Connect, up to 4800 bps	9,900	40.50	230
B 1653-3	Binary Synchronous Data Set Connect, up to 9600 bps	11,000	42.90	255

\* Rental prices include equipment maintenance.

Note: Peripherals and controls with prefix "A" are used with the B 1710 Series systems while those with prefix "B" are used with B 1720 Series systems. Those with an "A/B" prefix are used with all systems.

## Burroughs B 1700 Series

### SOFTWARE PRICES

	Single Payment	12 Monthly Payments	Annual Maint. Charge	Monthly Fee (3-Year Plan)	Monthly Fee (5-Year Plan)
<b>SYSTEMS PROGRAMS*</b>					
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
<b>BUSINESS MANAGEMENT SYSTEM</b>					
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
<b>BANK MANAGEMENT SYSTEM</b>					
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
<b>FINANCIAL MANAGEMENT SYSTEM</b>					
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	—
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	—
<b>INDUSTRIAL MANAGEMENT SYSTEM</b>					
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
<b>HOSPITAL MANAGEMENT SYSTEM</b>					
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
<b>OTHER APPLICATIONS SOFTWARE</b>					
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
DMS-II	12,000	1,100	1,200	300	288

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

\*\* 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).