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Burroughs B 1700 Series

MANAGEMENT SUMMARY

The Burroughs B 1700 Series computers, unveiled in June 1972, constitute the most significant new line of small-scale data processing systems to reach the marketplace since IBM unveiled the System/3 in July 1969. Although the distinctions among the computer "generations" are becoming increasingly blurred, the B 1700 systems more clearly deserve to be called "fourth generation" computers than any others introduced to date. Burroughs has managed to incorporate, into systems which rent for just $1,500 to $12,500 per month, nearly all of today's most advanced hardware and software concepts, including semi-conductor main memories, interated-circuit logic, integrated-dynamically variable microprogramming, automatic multi-programming, and virtual memory.

The B 1700 product line currently consists of four central processors – the B 1712, B 1714, B 1726, and B 1728 – and a broad array of peripheral equipment. Software support centers on the Master Control Program, a comprehensive disk-based operating system, and includes compilers for the COBOL, RPG, FORTRAN, and BASIC languages. In addition, a library of Business Management Systems includes programs for most of the common applications in manufacturing, wholesaling, distribution, banking, utilities, and hospitals. An unbundled pricing plan imposes separate charges for technical support, education, and all software except the MCP and utility routines.

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

CHARACTERISTICS

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

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

MAIN STORAGE

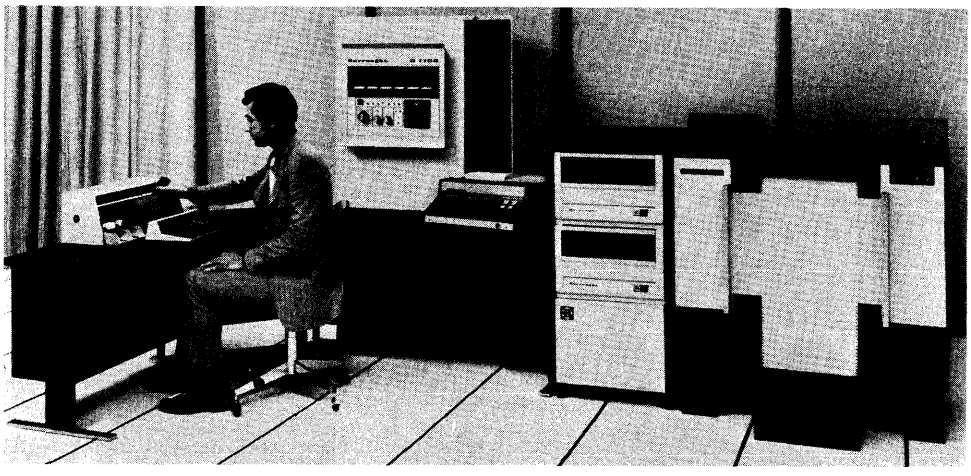
The B 1700 Series main memories are addressable to the bit level and utilize no preferred word or byte boundaries that are visible to the rest of the system. Variable instruction and operand lengths permit from 1 to 65,536 bits of data to be addressed with a single instruction, and up to 24 bits can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

STORAGE TYPE: MOS/LSI semiconductor.

CAPACITY: B 1712–16,384 to 40,960 eight-bit bytes in 8,192-byte increments; B 1714–16,384 to 65,536 bytes in 8,192-byte increments; B 1726–24,576 to 98,304 bytes in 8,192-byte increments to 65K and 16,384-byte increments thereafter; B 1728–65,536 to 262,144 bytes in 16,384-byte increments.

CYCLE TIME: See table.

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



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

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the individual bit level provide great flexibility in data field lengths and, according to Burroughs, yield increases of 20 to 40 percent in the efficiency of memory utilization for most applications.

It is clear that Burroughs has not shown its full hand to date. The B 1700 central processors are, essentially, "universal emulators" that should be capable, when equipped with the appropriate microprograms, of executing programs written for virtually any other computer at a relatively high level of efficiency. But at this writing, only two emulation microprograms have been released: a Burroughs B 300 Series Emulator, introduced along with the B 1700 systems in June 1972, and an IBM 1401, 1440, 1460 Emulator, announced in July 1973. Both emulators can be used only on the B 1726 and B 1728 Processors. Best bets for future emulation, considering the marketing orientation of the B 1700 systems, are the IBM 360/20, IBM System/3, Honeywell Series 200, NCR Century Series, and UNIVAC 9000 Series. The B 1700 architecture also forms an excellent basis for future expansion. As an example, the basic design could readily accommodate two or more central processors, but no multiple-processor B 1700 Series systems have been announced to date.

The B 1700 Series was introduced in June 1972 and expanded through the addition of the B 1728 Processor in July 1973. At announcement time, approximately 25 systems were operating within the Burroughs organization. Customer deliveries of systems using the B 1712 and B 1714 systems began in the third quarter of 1972, while B 1726 and B 1728 deliveries began in the second and third quarters of 1973, respectively. By October 1973, according to reliable industry sources, Burroughs had received more than 1000 orders for the B 1700 Series and had delivered more than 400 systems. As one might expect, the great majority of systems installed to date utilize the B 1712 and B 1714 Processors.

The general characteristics of the four 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 1700 Series", consisting of the B 1712 and B 1714 Processors, and the considerably more powerful "B 1720 Series", consisting of the B 1726 and B 1728 Processors. The two B 1720 Series processors, in addition to their faster cycle times, feature high-speed control memories and several other throughput-boosting features which are not present in the smaller models.

The low-cost B 1712 Processor is quite limited in the types and speeds of I/O devices that can be connected and is restricted to a maximum of 18.4 million bytes of disk cartridge storage. Purchase prices of typical B 1712 systems range from about $70,000 to $120,000, with monthly lease prices ranging from $1,500 to $2,800. (To these prices, of course, prospective users must add the cost of Burroughs' unbundled software and support.)

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

CENTRAL PROCESSORS

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

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

For each B 1700 programming language, Burroughs has defined an "ideal machine" and developed a specialized microprogram, called an Interpreter, that makes the B 1700 appear to be logically equivalent to that machine. The Interpreter executes the instructions which have been generated by the corresponding compiler. These compiler-generated instructions are expressed in an appropriate S-language. Because the S-language and its Interpreter are oriented toward the characteristics of each programming language, Burroughs states that on the average only about one-tenth as many S-instructions need to be executed to perform a given function as in typical machine-level computer programs.

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

The four B 1700 Series processor models are program-compatible and generally similar in architecture, with one major exception. In the B 1712 and B 1714 Processors, all microprograms reside in main memory along with the compiler-generated S code and user data. The faster B 1726 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 1726 and B 1728 Processors have four additional microinstructions and four additional hardware registers beyond those of the B 1712 and B 1714; (2) the B 1726 and B 1728 Processors have an address (A) stack consisting of 32 elements, each 24 bits wide, whereas the address stack in the B 1712 and B 1714 Processors consists of only 16 elements, also 24 bits wide; (3) the B 1726 and B 1728,

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CHARACTERISTICS OF THE B 1700 SYSTEMS

	B 1712	B 1714	B 1726	B 1728
CENTRAL PROCESSORS				
Processor cycle time, nanoseconds	500	250	167	167
Maximum number of I/O controls	8	8	10	14
MAIN MEMORY				
Minimum capacity, bytes	16,384	16,384	24,576	65,536
Maximum capacity, bytes	40,960	65,536	98,304	262,144
Read cycle time, microseconds	2.0	1.0	0.667	0.667
Write cycle time, microseconds	3.0	1.5	1.0	1.0
Bits fetched per cycle	Up to 24	Up to 24	Up to 24	Up to 24
CONTROL MEMORY				
Minimum capacity, bytes	None	None	2,048	6,144
Maximum capacity, bytes	None	None	4,096	8,192
Read cycle time, nanoseconds	–	–	167	167
Write cycle time, nanoseconds	–	–	225	225
Bits fetched per cycle	–	–	Up to 16	Up to 16
MAXIMUM I/O SPEEDS				
80-column card reading	300 cpm	600 cpm	1400 cpm	1400 cpm
80-column card punching	100 cpm	100 cpm	300 cpm	300 cpm
96-column card reading	300 cpm	500 cpm	500 cpm	500 cpm
96-column card punching	60 cpm	120 cpm	120 cpm	120 cpm
Printing (standard character sets)	300 lpm	750 lpm	1040 lpm	1040 lpm
Magnetic tape I/O	10 KB	36 KB	120 KB	120 KB
MICR document input	None	900 dpm	1625 dpm	1625 dpm
AVAILABILITY OF PERIPHERALS				
Disk Cartridge Drives	Yes	Yes	Yes	Yes
Dual Disk Pack Drive	No	No	Yes	Yes
Head-per-Track Memory Banks	No	No	Yes	Yes*
Single-Line Communications Control	No	Yes	Yes	Yes
Multi-Line Communications Control	No	No	Yes	Yes

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

The B 1714 Processor is twice as fast as the B 1712 and accommodates a considerably wider range of peripheral equipment; typical B 1714 systems range from about $75,000 to $200,000 in purchase price and from $1,600 to $3,500 in monthly lease price. A B 1712 Processor can readily be field-upgraded to a B 1714.

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

The B 1728 Processor, introduced in July 1973, expands the capabilities of the B 1700 family by offering from unlike the two smaller processors, have an 8-position Port Interchange that controls all accesses to main memory.

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

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

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

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

INPUT/OUTPUT CONTROL

I/O CHANNELS: Each type of peripheral device or subsystem requires a different I/O control, and each I/O control,

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

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

Technologically, the B 1700 systems are in tune with the times. They use medium-scale integration (MSI) logic circuits with processor cycling rates of up to 6 million cycles per second and MOS main memories with read cycle times as low as 667 nanoseconds per 24-bit access. The high-speed control memory, used only in the B 1726 and B 1728 Processors, provides 167-nanosecond bipolar storage for the most frequently used portions of the microprograms.

A magnetic tape cassette reader, housed in the console of the processor, is used for initial loading of the systems software. The cassette reader is also used to load diagnostic routines which aid Burroughs field engineers in isolating malfunctioning circuit boards. A newly designed Maintenance Diagnostic Unit helps the field engineers to identify faulty components on the circuit boards. Moreover, the individual MSI circuit devices can readily be unplugged from the boards and replaced when failures occur.

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

A family of low-cost, Caelus-built disk drives provides 2.3 or 4.6 million bytes of data storage on each single-disk cartridge. Larger-capacity disk pack drives and the time-tested Burroughs head-per-track disk files are available for use with the B 1726 and B 1728 systems. A compact in turn, requires an appropriate "slot" in the central processor. The maximum number of I/O controls is 8 in a B 1712 or B 1714 system, 10 in a B 1726 system, and 14 in a B 1728 system.

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

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

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

The B 1726 and B 1728 Processors have eight different types of I/O subsystem "slots" which determine the number and types of I/O controls that can be connected. The maximum numbers of I/O controls that can be accommodated by the basic B 1726 Processor are as follows: 5 Type A, 3 Type B, 1 Type C, 2 Type D, 2 Type E, 2 Type F, 1 Type G, and 1 Type H. The maximum numbers of I/O controls that can be accommodated by the basic B 1728 Processor are as follows: 4 Type A, 3 Type B, 1 Type C, 2 Type D, 2 Type E, 1 Type F (in addition to the standard Systems Disk control), 1 Type G, and 1 Type H. The optional B 1305 I/O Expansion Feature gives either a B 1726 or B 1728 the capability to accommodate as many as 5 more Type A, 3 Type B, 1 Type C, or 2 Type D controls. The allowable combinations of controls, however, are limited by various interrelationships and by the overall maximum limit of 10 controls on a B 1726 and 14 on a B 1728.

Devices which require Type A controls in B 1726 and B 1728 systems are the 9340 Console Printer, all 80-column card readers, and the 9240 series line printers. Type B controls are required by the 80-column card punch, all 96-column card units, the paper tape reader and punch, the 9247 Printer, and all MICR reader-sorters. Type C controls are required by the 9480 and 9481 Disk Cartridge subsystems. Type D controls are required by the Single-Line Communications Control. Type E controls are required by the magnetic tape subsystems (except that the 10KB B 9491-2 can alternatively use a Type B control). Type F controls are required by the head-per-track disk file subsystems. Type G controls are required by the disk pack subsystems. Type H controls are required by the Multi-Line Communications Control.

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

MASS STORAGE

9480/9481 DISK CARTRIDGE MEMORY SUBSYSTEMS: Provide low-cost random-access data storage on removable

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10KB magnetic tape unit is available for all four B 1700 systems, and the larger models can also make use of Burroughs' Magnetic Tape Clusters, which house two, three, or four tape drives and transfer data at 18KB or 36KB, or a variety of free-standing tape drives rated at up to 120KB. Nine line printers offer speeds ranging from 90 to 1040 lpm and a choice of drum, chain, or train printing techniques. The banking field, where Burroughs is particularly strong, is served by new 600-dpm and 900-dpm MICR sorter-readers in addition to the earlier 1000-dpm and 1625-dpm models. A paper tape reader and punch were added to the peripheral line-up in July 1973, but no optical reading equipment has been announced for the B 1700 systems to date.

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

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

All software support for the B 1700 systems is built around the MCP, the integrated operating system that complements the hardware to create an usually effective environment for multiprogrammed operation in any B 1700 system with at least 24K bytes of main memory. (A smaller version of the MCP without multiprogramming, MICR, or communications capabilities is available for use on 16K systems.) Like the MCP's for the larger Burroughs computers, the B 1700 MCP is truly user-oriented and much easier to understand and use than most of the competitive operating systems. The MCP receives its orders through straightforward messages entered via the console keyboard or control cards.

The B 1700 Series systems, like the large-scale Burroughs B 6700 Series systems, will be programmed almost exclusively in higher-level languages. Compilers are available for the COBOL, RPG, FORTRAN, and BASIC

single-disk cartridges. Four models are available:

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

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

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

9484-4 DISK PACK DRIVE SUBSYSTEM: Usable only in B 1728 systems, this high-performance disk pack subsystem can consist of two to six spindles with an on-line storage capacity of 87.5 million bytes per spindle. 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. Every 9484-4 subsystem includes a 1484-4 Disk Pack Control and one 9484-4 Dual Drive unit with two independent spindles. 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 six spindles and 525 million bytes. The 1484-4 Disk Pack Control is a programmable miniprocessor that features a 720-byte data buffer and an error correction facility; it communicates directly with main memory via the Port Interchange.

9486-2 DISK PACK DRIVE SUBSYSTEM: Usable only in B 1726 or B 1728 systems, this disk pack subsystem consists of two or four spindles with an on-line storage capacity of 47.8 million bytes of formatted data per spindle. Data is recorded on removable 11-disk packs. Average head positioning time is 30 milliseconds, and average rotational delay is 12.5 milliseconds. A 1486 Disk Pack Control and one or two 9486-2 Dual Drive units, each with two independent spindles, comprise a subsystem. The 1486 Disk Pack Control is a programmable miniprocessor that features a 720-byte data buffer and an error correction facility; it communicates directly with main memory via the Port Interchange.

HEAD-PER-TRACK MEMORY BANKS: Usable only in B 1726 or B 1728 systems, these units provide rapid random access to data on nonremovable disk files with a fixed read/write head serving each track. Two models are available. The 9371-7 Memory Bank stores 8.1 million bytes with an average access time of 20 milliseconds; up to 4 additional 8.1-million-byte modules can be added for a maximum subsystem capacity of 40.5 million bytes. The 9371-14 Memory Bank stores 14 million bytes with an average access time of 40 milliseconds; up to 4 additional 14-million-byte modules can be added for a maximum subsystem capacity of 70 million bytes. A 1374 Disk File Control is required in each subsystem. The basic B 1728-1

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languages, but not for PL/1. Associated with each compiler is an Interpreter – a specialized microprogram that is used at execution time to interpret and execute the code generated by the compiler. The B 1700 microprogramming itself–which presents all sorts of fascinating possibilities for systems engineers and software designers – is not user-accessible at the present time, although Burroughs will now, under separate contract, disclose details of the machine structure and microprogramming to universities and colleges for use in advanced computer science or special research activities.

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

Until Burroughs announces additional emulators, program compatibility with computers other than the IBM 1401/1440/1460 and Burroughs' own B 300 Series will be achieved via higher-level languages. The B 1700 COBOL and FORTRAN compilers conform with the American National Standards for these languages. Programs written in RPG or RPG II for IBM computers can either be compiled by the B 1700 RPG compiler or translated into COBOL by the COFIRS II (COBOL From IBM RPG Specifications) routine.

Data compatibility with most computer systems can be achieved via punched cards (80- or 96-column) or magnetic tapes files, but the disk cartridges and disk packs used in Burroughs drives are not format-compatible with the ones used in competitive systems.

The B 1700 systems, together with the smaller B 700 systems announced in March 1973, effectively plug the sizeable product-line gap that once existed between the widely used Burroughs L Series accounting computers and the considerably larger B 2700 systems. Thus, they will surely prevent many current Burroughs users from moving to competitive systems (most commonly the IBM System/3) when they outgrow their L Series machines.

What's more, the B 1700 systems clearly have what it takes to attract hundreds, and quite possibly thousands, of new customers into the Burroughs fold. In competitive situations, the B 1712 and B 1714 systems will generally be up against the IBM System/3 and the smaller models of the Honeywell Series 200, NCR Century Series, and UNIVAC 9000 Series computer families. Within this class, the B 1700 Systems rank at the top in technology, flexibility, and – in all probability – raw performance per dollar. The larger B 1726 and B 1728 systems compete in the range of the IBM System/370 Model 115 and Model

Central System includes a 1374 Control and one 8.1-million-byte module of the 20-millisecond 9371-7 storage; up to 4 additional 8.1-million-byte modules can be added.

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

INPUT/OUTPUT UNITS

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

9381 MAGNETIC TAPE CLUSTERS: Contain two, three, or four tape drives in a single compact cabinet. The feed and take-up reels for each tape drive are mounted on concentric vertical shafts, with the feed reel directly above the take-up reel. Pinch rollers and short vacuum-column buffers are employed. Each of the tape drives has its own drive mechanism, but they share a common power supply and read/write circuitry. The following six models are available for use in B 1714, B 1726, or B 1728 systems:

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

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

FREE-STANDING MAGNETIC TAPE UNITS: Burroughs offers six models of free-standing tape drives for use in B 1726 or B 1728 systems only. All six models read and record data on 1/2-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.

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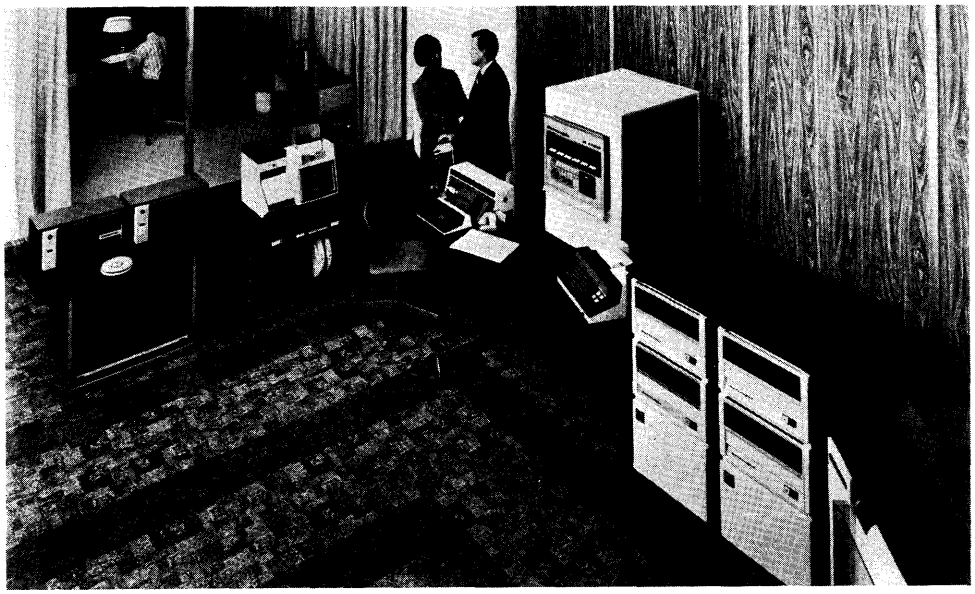

This medium-sized B 1700 System is equipped with two of Burroughs low-cost 10KB magnetic tape drives (far left) and a pair of dual disk cartridge drives.

125, respectively – and even in this fast company, the advanced technology and user-oriented design of the Burroughs systems make them thoroughly competitive.

USER REACTION

Datapro spoke at length with six users of the B 1700 Series computers. This sample included four of the 400-odd current users of the small-scale B 1712 and B 1714 systems and two of the handful of current users of the considerably more powerful B 1726 system.

Among these users, the overall level of satisfaction was outstandingly high. Nearly all were enthusiastic about the system's ease of operation and about the effectiveness and comparative simplicity of the multiprogramming environment created by the MCP. One user who has had extensive experience with large-scale IBM systems is regularly running two jobs simultaneously on his 32K B 1712 system; he feels it's "astonishing that Burroughs can do so much in a much smaller system; it just takes longer to get the job done." Another user pointed out that "the MCP takes some getting used to; you have to build up confidence that it really knows how to handle file and memory allocation and all those other things you used to have to do yourself."

The users judged the reliability of the B 1700 Series mainframe and peripheral devices to be quite high after the inevitable start-up problems had been diagnosed and corrected. In similar fashion, the users found numerous bugs in the early releases of the MCP, compilers, and other software, but they noted that the improvements have been steady and dramatic. In fact, one delighted B 1726 user pronounced the recently delivered Release 3.2 software "solid as a rock." In their choice of programming languages, the users were evenly divided between COBOL and RPG, and all were pleased with the current compilers.

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 only with B 1714, B 1726, or B 1728 systems.

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

9111/9112 CARD READER: Reads standard 80-column cards serially by column, on demand, at up to 800 cpm (9111) or 1400 cpm (9112). The feed hopper and stacker hold up to 2400 cards each and can be loaded and unloaded while the reader is operating. Usable only with B 1726 or B 1728 systems.

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

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

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The Burroughs maintenance service and technical support received similarly high marks. Three of the six users made the point that the Burroughs support people tend to be fewer in number but better qualified and more helpful than their counterparts with other mainframe vendors. In general, the users felt that Burroughs was quite responsive to their specialized needs and problems.

On the negative side, two users registered mild complaints about delays in the delivery of the dual disk pack drives for the B 1700 systems – and one prospective B 1726 user cancelled his order for the same reason. The slippage was appararently caused by problems in the design of the associated controller, and deliveries are now expected early in 1974. Two other users who ordered the 9481 Disk Cartridge Memory Subsystems were temporarily supplied with the lower-density 9480 subsystem instead, apparently as a result of similar problems with the controller for the 9481 subsystem.

Thus, the only problems reported by the users are of the types that are nearly inevitable with computers as new as the B 1700 Series systems – and Burroughs appears to be rapidly resolving them. Meanwhile, user experience is clearly confirming the validity and effectiveness of the B 1700 Series design concepts. □

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

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

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

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

9319-4 HIGH-SPEED READER PUNCH: Reads 96-column cards at 500 cpm, and punches and/or prints at 120 cpm. The single card feed path includes: one 2000-card input hopper, read station, punch wait station, punch station, punch check station, print wait station, print station, stacker turn station, and three 1200-card stackers. The printer station permits printed interpretation of the punched cards at 120 cpm, with four 32-character lines per card. Input and output data is buffered. Usable only with B 1714, B 1726, or B 1728 systems.

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

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

B 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 metallized Mylar tape. Handles reels either 5.5 or 7 inches in diameter. A standard channel-select plugboard and optional Input Code Translator permit wide flexibility in codes. Usable only with B 1726 or B 1728 systems.

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

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

- 9249-1: 90-lpm Chain Printer (for B 1712 and B 1714).
- 9249-2: 180-lpm Chain Printer (for B 1712 and B 1714).
- 9245-16: 300-lpm Drum Printer (for B 1712 and B 1714).
- 9245:19: 400-lpm Drum Printer (for B 1714 only).
- 9240-1: 475-lpm Drum Printer (for B 1714, B 1726, and B 1728).
- 9240-2: 700-lpm Drum Printer (for B 1714, B 1726, and B 1728).
- 9240-3: 1040-lpm Drum Printer (for B 1726 and B 1728).
- 9247-2: 400-lpm Train Printer (for B 1714, B 1726, and B 1728).

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9247-3: 750-lpm Train Printer (for B 1714, B 1726, and B 1728).

All of the printers have 132 print positions except the 9247 Train Printers, in which 120 positions are standard and 12 additional positions are optional. 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; the 96-character set contains both upper and lower case alphabetics. 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 offers six MICR reader-sorters for use with the larger B 1700 Series systems, including the new, low-cost 9135/9136 series:

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

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

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

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

9131-1: 1000 dpm, 13 pockets (for B 1726 and B 1728).

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

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

The 9131-1 and 9134-1 Reader-Sorters are high-performance units that can be equipped with a variety of optional features.

COMMUNICATIONS CONTROL

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

1352 MULTI-LINE CONTROLLER: Provides the interface between a B 1726 or B 1728 Processor and up to 8 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. Ten 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 or 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. Announced in June 1973, the 1352 MLC and 1353 Controller Extension are scheduled for initial customer deliveries in the first and third quarters of 1974, respectively.

SOFTWARE

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

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

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

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

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

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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 16K bytes of main memory, console printer, disk drive, line printer, and card reader. The compiler itself requires about 10K bytes of memory. Object programs generated by the COBOL compiler are expressed in an S-language that is oriented toward efficient handling of 4-bit digits and 8-bit characters. The COBOL Interpreter, required at execution time, occupies about 3K bytes of memory in addition to the object program's requirements.

REPORT PROGRAM GENERATOR: The B 1700 RPG Compiler converts source programs written in the widely used RPG language into object programs that can be executed by B 1700 systems. The compiler permits programs written in IBM RPG or RPG II, or in most other versions of the RPG language, to be compiled and run with little or no change. RPG programs are automatically segmented during compilation, so programs can be written without the usual limitations imposed by the computer's memory capacity. The RPG Compiler runs on any B 1700 processor with at least 16K bytes of main memory, console printer, disk drive, line printer, and card reader. The compiler itself requires about 8K bytes of memory. The RPG Interpreter – which is actually the same interpreter used for COBOL object programs – occupies about 3K bytes of memory at execution time in addition to the object program's requirements.

FORTRAN: The B 1700 FORTRAN language is compatible with American National Standard FORTRAN and includes certain Burroughs extensions. It is also compatible with IBM FORTRAN IV Level H. The FORTRAN compiler runs on any B 1700 processor with at least 16K bytes of main memory, console printer, disk drive, line printer, and card reader. The compiler itself requires about 8K 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 16K 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.

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

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

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

B 300 SERIES EMULATOR: This emulator enables a B 1726 or B 1728 to execute object programs written for the popular, second-generaion Burroughs B 300 Series computers. The emulator is essentially a microcoded B 300 Series instruction set that has been implemented in the variable micrologic of the B 1700 Series. The following B 300 Series peripheral devices are directly replaced by their B 1700 Series counterparts: 80-column card readers and punches, buffered line printers, magnetic tape units, disk files, and the supervisory printer. On-line banking systems, data communications terminals, MICR reader-sorters, and 6-tape listers, however, are not supported under emulation. The current version of the B 300 Series emulator is a "stand-alone" program that cannot be run under MCP control.

IBM 1401, 1440, 1460 EMULATOR: This emulator enables a B 1726 or B 1728 to execute object programs written for an IBM 1401, 1440, or 1460 computer. The emulator is essentially a microcoded IBM 1400 Series instruction set that has been implemented in the variable micrologic of the B 1700 Series. The emulator supports most of the 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 I/O operations will normally be performed at peripheral speeds. The emulator requires a B 1726 or B 1728 system with at least 49K bytes of main memory and 4K bytes of control memory. The initial version of the emulator, released in the third quarter of 1973, is a "stand-

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alone" program that cannot be run under MCP control. Therefore, it is not currently possible to intermix 1401/1440/1460 programs and B 1700 programs in a multiprogramming environment.

UTILITY ROUTINES: A disk sort program sorts records into ascending or descending sequence in accordance with specification cards that describe the input and output files, the key field or fields, and various 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.

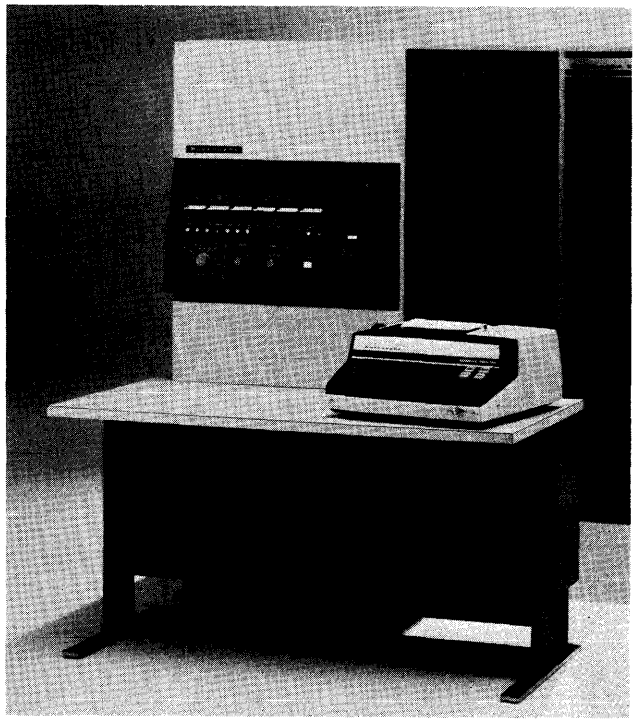
APPLICATION PROGRAMS: Burroughs offers a library of Business Management Systems which are designed to provide operational control through comprehensive management reports. The basic Business Management System (BMS) consists of four main modules: Invoicing, Accounts Receivable, and Inventory Control System;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

Still more specialized in their orientation are the Bank Management System, the Industrial Management System, and the Hospital Management System. The main modules of each of these systems are listed in the "Software Prices" section at the end of this report.

PRICING

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

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



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

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

TYPICAL B 1726 SYSTEM: Consists of 48K B 1726 Processor with 2K bytes of Control Memory, console printer, 96-column card reader punch (reads 500 cpm, punches 120 cpm), 700-lpm printer with 132 print positions, and six disk cartridge drives (27.6 million bytes). Monthly rental and purchase prices are $4,800 and $219,808, respectively.

TYPICAL B 1728 SYSTEM: Consists of 163K B 1728-1 Central System (including console printer and 8.1 million bytes of Systems Disk storage), 800-cpm 80-column card reader, 300-cpm 80-column card punch, 750-lpm train printer with 132 print positions, two 80KB magnetic tape units, and one B 9484-4 Dual Disk Pack Drive (175 million bytes). Monthly rental and purchase prices are $10,480 and $477,748, respectively.

SOFTWARE: The appropriate Master Control Program, sort package, and utility routines are provided to all B 1700 users at no additional cost. The compilers and other "program development aids" are offered at the following monthly license fees: COBOL – $50, RPG – $50, FORTRAN – $100, BASIC – $70, NDL – $50, UPL – $200, Disk-FORTE II – $275, 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

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Limited-Time License Plan, with monthly payments during either a 3-year or 5-year lease term. The available Program Products and their associated license fees are listed under "Software Prices" at the end of this report.

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

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

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

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

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

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

Burroughs B 1700 Series
EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
PROCESSORS AND MAIN STORAGE				
B 1712	Processor with 16K bytes of memory	27,225	90	560
Memory Options for B 1712 Processor:				
B 1012-24	24K Bytes Total Memory	5,000	10	150
B 1012-32	32K Bytes Total Memory	12,000	16	400
B 1012-40	40K Bytes Total Memory	17,000	27	550
B 1714	Processor with 16K bytes of memory	34,225	95	780
Memory Options for B 1714 Processor:				
B 1014-24	24K Bytes Total Memory	5,000	13	150
B 1014-32	32K Bytes Total Memory	11,000	18	350
B 1014-40	40K Bytes Total memory	20,000	25	550
B 1014-49	49K Bytes Total Memory	26,000	36	700
B 1014-57	57K Bytes Total Memory	32,000	48	850
B 1014-65	65K Bytes Total Memory	38,000	61	1,000
B 1726	Processor with 24K bytes of main memory and 2K bytes of Control Memory	78,300	140	1,740
Memory Options for B 1726 Processor:				
B 1026-32	32K Bytes Total Memory	5,400	10	85
B 1026-40	40K Bytes Total Memory	10,800	15	205
B 1026-49	49K Bytes Total Memory	16,200	22	325
B 1026-57	57K Bytes Total Memory	21,600	28	460
B 1026-65	65K Bytes Total Memory	27,000	35	610
B 1026-81	81K Bytes Total Memory	42,190	47	935
B 1026-98	98K Bytes Total Memory	57,380	60	1,285
B 1728-1	Central System; includes 6,144 bytes of control memory, 65,536 bytes of main memory, I/O base, console and table, console printer and control, disk file control and electronics unit, and 8.1 million bytes of Systems Disk storage	181,688	415	3,825
Memory Options for B 1728-1 Processor:				
B 1028-81	81,920 Bytes Total Memory	11,000	12	250
B 1028-98	98,304 Bytes Total Memory	19,800	25	450
B 1028-114	114,688 Bytes Total Memory	28,600	37	650
B 1028-131	131,072 Bytes Total Memory	37,400	49	850
B 1028-147	147,456 Bytes Total Memory	46,200	61	1,050
B 1028-163	163,840 Bytes Total Memory	55,000	73	1,250
B 1028-180	180,224 Bytes Total Memory	63,800	85	1,450
B 1028-196	196,608 Bytes Total Memory	72,600	97	1,650
B 1028-212	212,992 Bytes Total Memory	81,400	109	1,850
B 1028-229	229,376 Bytes Total Memory	90,200	121	2,050
B 1028-245	245,760 Bytes Total Memory	99,000	133	2,250
B 1028-262	262,144 Bytes Total Memory	107,800	145	2,450
Processor Options:				
A/B 1305	I/O Expansion Feature (for all processors)	1,500	5	30
A/B 9340	Console Printer (for B 1712, B1714, or B 1726)	2,640	15	55
A 1340	Console Printer Control (for B 1712 or B 1714)	1,800	5	60
B 1340	Console Printer Control (for B 1726)	2,230	5	60
B 1026-2	2,048 Bytes Additional Control Memory (for B 1726)	9,600	30	400
B 1028-2	2,048 Bytes Additional Control Memory (for B 1728)	9,600	30	400
B 1097-3	Console Corner Table (for B 1726 or B 1728)	720	0	15
B 1098	Processor Extension Cabinet (for B 1728)	9,900	15	225
B 9374-17	Add-On Systems Disk module; 8.1 million bytes (max of 4; for B 1728	19,200	118	400
MASS STORAGE				
A/B 9480-1	Single Disk Cartridge Drive; 2.3 million bytes	10,000	32.50	250
A/B 9480-2	Dual Disk Cartridge Drive; 4.6 million bytes	15,480	55.60	365
A/B 9481-1	Single Disk Cartridge Drive; 4.6 million bytes	13,200	49.30	310
A/B 9481-2	Dual Disk Cartridge Drive; 9.2 million bytes	21,600	75.60	480
A 1480	Control for 9480-1 & 9480-2 Drives (B 1712/1714)	2,700	14	90
B 1480	Control for 9480-1 & 9480-2 Drives (B 1726/1728)	4,665	15	97
A 1481	Control for 9481-1 & 9481-2 Drives (B 1712/1714)	3,500	15	100
B 1481	Control for 9481-1 & 9481-2 Drives (B 1726/1728)	4,665	15	97
A/B 9985-2	Disk Cartridge for 9480-1 & 9480-2 Drives	170	—	—
A/B 9985-3	Disk Cartridge for 9481-1 & 9481-2 Drives	225	—	—
B 9486-2	Dual Disk Pack Drive; 95.5 million bytes total	46,750	129	1,000
B 9484-4	Dual Disk Pack Drive; 175 million bytes total	63,380	201	1,610
B 9486-45	Single Disk Pack Drive Add-On Increment for B 9484-4; 87.5 million bytes	32,690	108	830
B 9486-4	Dual Disk Pack Drive Add-On Increment for B 9484-4; 175 million bytes total	57,380	177	1,460

*Rental prices include equipment maintenance.

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

Burroughs B 1700 Series
EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
MASS STORAGE (Continued)				
B 1486	Disk Pack Control for B 9486-2 drives (B 1726/1728)	45,600	143	950
B 1484-4	Disk Pack Control for B 9484-4 drives (B 1728 only)	45,600	108	950
B 9371-7	Head-per-Track Memory Bank; 8.1 million bytes	28,800	215	600
B 9371-14	Head-per-Track Memory Bank; 14 million bytes	36,000	210	750
B 9374-17	8.1-Million-Byte Add-On Unit for B 9371-7	19,200	94	400
B 9374-10	14-Million-Byte Add-On Unit for B 9371-14	26,400	115	550
B 1374	Control for Head-per-Track Memory Banks (B 1726/1728)	9,600	12	200
B 1674-1	1 x 2 Head-per-Track Adapter	1,980	7	45
B 1674-2	2 x n Head-per-Track Exchange	1,760	5	40
MAGNETIC TAPE EQUIPMENT				
A/B 9381-12	Magnetic Tape Cluster; 18KB, 2 stations	25,200	179	525
A/B 9381-13	Magnetic Tape Cluster; 18KB, 3 stations	26,960	200	570
A/B 9381-14	Magnetic Tape Cluster; 18KB, 4 stations	32,160	241	680
A/B 9381-22	Magnetic Tape Cluster; 36KB, 2 stations	33,600	205	700
A/B 9381-23	Magnetic Tape Cluster; 36KB, 3 stations	43,200	236	900
A/B 9381-24	Magnetic Tape Cluster; 36KB, 4 stations	52,800	267	1,100
A 1381	Magnetic Tape Cluster Control (B 1714)	6,000	38	250
B 1381	Magnetic Tape Cluster Control (B 1726/1728)	6,960	38	250
A/B 9491-2	Magnetic Tape Unit; 10KB, 9 tracks	8,600	21	215
A 1491-2	10KB Tape Control (B 1712/1714)	3,900	30	200
B 1491	10KB Tape Control (B 1726/1728)	10,368	30	216
B 9390	Magnetic Tape Unit; 18/50KC, 7 tracks	15,860	149	330
B 9391	Magnetic Tape Unit; 18/50/72KC, 7 tracks	18,000	169	375
B 9394-2	Magnetic Tape Unit; 96KB, 9 tracks	20,400	174	425
B 1390	Magnetic Tape Control; 18/50/72KC, 7 tracks (B 1726/1728)	6,960	38	250
B 1394-2	Magnetic Tape Control; 96KB, 9 tracks (B 1726/1728)	12,300	40	300
B 9496-2	Magnetic Tape Unit; 40KB, 9 tracks	12,800	65	270
B 9496-4	Magnetic Tape Unit; 80KB, 9 tracks	15,300	69	320
B 1496-4	Magnetic Tape Control; 40/80KB, 9 tracks (B 1726/1728; requires B 9499-30 or -31)	15,740	53	325
B 9499-30	Master Electronic Exchange; 1 x 4 (for B 1496-4)	5,500	20	125
B 9499-31	Master Electronic Exchange; 1 x 8 (for B 1496-4)	8,800	20	200
B 9495-2	Magnetic Tape Unit; 120KB, 9 tracks	16,650	74	400
B 1495-2	Magnetic Tape Control; 120KB, 9 tracks (B 1726/1728; requires B 9499-10 or -11)	19,130	53	460
B 9499-10	Master Electronic Exchange; 1 x 4 (for B 1495-2)	5,500	20	125
B 9499-11	Master Electronic Exchange; 1 x 8 (for B 1495-2)	8,800	20	200
80-COLUMN CARD EQUIPMENT				
B 9111	Card Reader; 800 cpm	16,250	85	325
B 9112	Card Reader; 1400 cpm	21,600	129	450
A/B 9115	Card Reader; 300 cpm	4,500	25	110
A/B 9116	Card Reader; 600 cpm	6,500	35	195
B 9117	Card Reader; 800 cpm	9,000	43	250
A 1115	Control for A 9115 Reader (B 1712/1714)	900	7	45
A 1116	Control for A 9116 Reader (B 1714)	1,200	8	55
B 1111	Control for B 9111 & 9112 Readers (B 1726/1728)	2,332	7	48
B 1115	Control for B 9115, 9116, & 9117 Readers (B 1726/1728)	2,160	8	45
B 9917	Card Counter (for B 9111 & 9112)	240	—	5
B 9918	Postal Money Order Feature (for B 9111 & 9112)	1,440	5	30
B 9919	40-Column Read Switch (for B 9111 & 9112)	190	—	—
A/B 9210-1	Card Punch; 100 cpm	12,000	70.20	250
A 1210-1	Control for A 9210-1 Punch (B 1712/1714)	4,320	14	90
B 1210	Control for B 9210-1 Punch (B 1726/1728)	4,320	14	90
B 9213	Card Punch; 300 cpm	25,440	145	530
B 1213	Control for B 9213 Punch (B 1726/1728)	4,320	14	90
96-COLUMN CARD EQUIPMENT				
A/B 9119-1	Card Reader; 300 cpm	3,500	25	85
A/B 9319-2	Card Reader Punch; reads 300 cpm, punches 60 cpm	7,990	60	200
A/B 9319-4	Card Reader Punch; reads 500 cpm, punches 120 cpm	11,190	91	310
A/B 9419-2	Card Reader Punch/Data Recorder; reads 300 cpm, punches 60 cpm	9,490	71	240
A/B 9419-6	Multi-Purpose Card Unit; reads 300 cpm, punches 60 cpm, sorts 300 cpm	11,390	85	285
A 1119-1	Control for A 9119-1 (B 1712 & 1714)	900	7	45
B1119	Control for B 9119-1 (B 1726)	2,332	7	48
A1319-2	Control for A 9319-2 (B 1712 & 1714)	1,900	10	65
A 1319-4	Control for A 9319-4 (B 1714)	2,300	11	70

*Rental prices include equipment maintenance.

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

Burroughs B 1700 Series
EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
96-COLUMN CARD EQUIPMENT (Continued)				
B 1319	Control for B 9319-2 & 9319-4 (B 1726)	3,628	11	75
A 1419-2	Control for A 9419-2 (B 1712 & 1714)	1,900	10	65
A 1419-6	Control for A 9419-6 (B 1712 & 1714)	2,100	11	70
B 1419	Control for B 9419-2 & 9419-6 (B 1726)	2,332	11	75
PAPER TAPE EQUIPMENT				
B 1120	Paper Tape Reader Control (B 1726/1728)	1,800	9	50
B 9120	Paper Tape Reader; 500/1000 char/sec.	16,000	75.60	300
B 9926	Input Translator for B 9120	6,960	10.80	145
B 1220	Paper Tape Punch Control (B 1726/1728)	2,100	19	60
B 9220	Paper Tape Punch; 100 char/sec.	15,300	70.20	260
B 9928	Output Translator for B 9220	6,850	10.80	124
LINE PRINTERS				
A/B 9240-1	Printer; 475 lpm, 132 positions	19,500	174	475
A/B 9240-2	Printer; 700 lpm, 132 positions	31,000	179	625
A 9245-16	Printer; 300 lpm, 132 positions	20,000	149	475
A 9245-19	Printer; 400 lpm, 132 positions	23,000	154	575
A/B 9247-2	Train Printer; 400 lpm, 120 positions	19,500	100	460
A/B 9247-3	Train Printer; 750 lpm, 120 positions	33,000	138	710
A 9249-1	Printer; 90 lpm, 132 positions	8,500	60	240
A 9249-2	Printer; 180 lpm, 132 positions	11,200	70	280
B 9240-3	Printer; 1040 lpm, 132 positions	43,500	195	900
A 1240-1	Control for A 9240-1 (B 1714)	1,400	9	50
A 1240-2	Control for A 9240-2 (B 1714)	1,500	11	70
A 1245-16	Control for A 9245-16 (B 1712 & 1714)	1,400	8	50
A 1245-19	Control for A 9245-19 (B 1714)	1,500	11	70
A 1247-3	Control for A 9247 Train Printers (B 1714)	1,800	44	215
A 1249-1	Control for A 9249-1 (B 1712 & 1714)	1,000	5	35
A 1249-2	Control for A 9249-2 (B 1712 & 1714)	1,100	6	40
B 1240	Control for B 9240-1, -2, or -3 (B 1726/1728)	2,880	9	60
B 1247	Control for B 9247 Train Printers (B 1726/1728)	4,320	14	90
B 9942-2	Additional 12 Print Positions for B 9247 Train Printers	2,000	10.80	40
B 9942-9	Additional Train Module for B 9247 Train Printers	3,500	18	65
B 9949-2	12-Channel Format Tape Reader for B 9247 Train Printers	3,050	15	61
MICR READER-SORTERS				
A 9135-2	Reader-Sorter; 900 dpm, 8 pockets	45,500	431	1,000
A 9135-3	Reader-Sorter; 900 dpm, 12 pockets	55,900	467	1,300
A/B 9136-5	Reader-Sorter; 600 dpm, 8 pockets	34,000	225	700
A/B 9136-6	Reader-Sorter; 600 dpm, 12 pockets	39,000	270	850
B 9131-1	Reader-Sorter; 1000 dpm, 13 pockets	57,600	461	1,200
B 9134-1	Reader-Sorter; 1625 dpm, 4 pockets (requires Feature B 9938-1)	49,200	333	1,025
A 1135	Control for A 9135-2 & 9135-3 (B 1714)	6,000	30	150
A 1136	Control for A 9136-5 & 9136-6 (B 1714)	6,000	30	150
B 1135	Control for B 9135-2 & 9135-3 (B 1726/1728)	6,480	30	200
B 1136	Control for B 9136-5 & 9136-6 (B 1726/1728)	6,998	23	162
B 1131	Control for B 9131-1 (B 1726/1728)	6,480	23	150
B 9932	Endorser (for B 9131-1)	9,000	54	200
B 1134	Control for B 9134-1 (B 1726/1728)	6,480	30	200
B 9932-1	Endorser (for B 9134-1)	9,000	54	200
B 9933-4	Extended Sort Control (for B 9134-1)	2,400	16.20	50
B 9935-2	Four-Pocket Module (for B 9134-1)	14,400	37.80	300
B 9938-1	Multi-Track E-13B Read (for B 9134-1)	18,000	59.40	375
COMMUNICATIONS CONTROLS				
A/B 1351	Single-Line Control (B 1714/1726/1728)	2,000	8	50
B 1352	Multi-Line Controller (8 lines; B 1726/1728)	13,000	28	200
B 1353	Multi-Line Controller Extension (8 lines; for B 1728 only)	6,750	21	150
Data Communications Line Adapters:				
A/B 1650-1	Asynchronous Data Set Connect, up to 1200 bps	1,500	8	50
A/B 1650-2	Asynchronous Data Set Connect, up to 1800 bps	1,800	10	65
A/B 1650-5	Asynchronous Direct-Connect, up to 1400 bps	1,500	8	50
A/B 1650-6	Asynchronous Direct-Connect, up to 4800 bps	1,800	10	65
A/B 1650-7	Asynchronous Direct-Connect, up to 9600 bps	2,100	12	80
A/B 1651-1	Synchronous Data Set Connect, up to 2400 bps	1,500	8	50
A/B 1651-2	Synchronous Data Set Connect, up to 4800 bps	1,800	10	65
A/B 1651-3	Synchronous Data Set Connect, up to 9600 bps	2,100	12	80
A/B 1652-1	Asynchronous Data Set Connect for Teletypewriters	1,500	8	50
A/B 1652-5	Asynchronous Data Set Connect for Teletypewriters	1,500	8	50

*Rental prices include equipment maintenance.

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

Burroughs B 1700 Series
SOFTWARE PRICES

		UNLIMITED-TIME PLAN			LIMITED-TIME PLANS	
		Single Payment	12 Monthly Payments	Annual Maint. Charge	Monthly Fee (3-Year Plan)	Monthly Fee (5-Year Plan)
BUSINESS MANAGEMENT SYSTEM						
B01	Business Management System (Accounts Receivable, Accounts Payable, Payroll, General Ledger)	7,100	650	360	NA	NA
B02	Business Management System**	9,500	857	360	NA	NA
R01	Invoicing, Accounts Receivable, Inventory	3,200	290	160	NA	NA
R02	Invoicing, Accounts Receivable, Inventory**	4,470	400	160	NA	NA
A01	Accounts Payable	1,400	128	70	NA	NA
A02	Accounts Payable**	2,445	224	70	NA	NA
P01	Payroll	1,800	165	90	NA	NA
P02	Payroll**	2,790	255	90	NA	NA
G01	General Ledger	1,400	128	70	NA	NA
G02	General Ledger**	2,445	224	70	NA	NA
BANK MANAGEMENT SYSTEM						
F01	Bank Management System (DDA, Savings, Installment Loans, Certificate of Deposit, Proof and Transit, General Ledger)	6,900	630	345	NA	NA
F02	Bank Management System**	9,475	870	345	NA	NA
D01	Demand Deposit Accounting	2,500	230	125	NA	NA
D02	Demand Deposit Accounting**	3,565	325	180	NA	NA
T01	Proof and Transit	1,000	90	50	NA	NA
T02	Proof and Transit**	2,095	190	105	NA	NA
S01	Savings	1,500	140	75	NA	NA
S02	Savings**	2,400	220	120	NA	NA
I01	Installment Loans	1,000	90	50	NA	NA
I02	Installment Loans**	2,130	195	110	NA	NA
C01	Certificate of Deposit	750	70	35	NA	NA
C02	Certificate of Deposit**	1,570	145	80	NA	NA
L01	General Ledger	500	45	25	NA	NA
L02	General Ledger**	1,510	140	75	NA	NA
INDUSTRIAL MANAGEMENT SYSTEM						
NCS	APT Level III (B 1726 & 1728)	6,300	580	150	150	144
PCE	Engineering Data Control (B 1726 & 1728)	4,500	415	100	100	96
PCR	Requirements Planning (B 1726 & 1728)	4,500	415	100	100	96
PCI	Inventory (B 1726 & 1728)	4,500	415	100	100	96
PCW	Work-In-Process (B 1726 & 1728)	6,000	550	140	140	135
HOSPITAL MANAGEMENT SYSTEM						
HSA	Patient Accounting	4,400	405	100	100	96
HSG	General Ledger	2,200	200	50	50	48
HSR	Medical Records	2,200	200	50	50	48
HSP	Payroll	2,200	200	50	50	48

**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).

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

Burroughs B 1700
NEW PRODUCT ANNOUNCEMENT

Burroughs extended the capabilities of its year-old B 1700 Series computers in July 1973 by introducing a more powerful central processor—the B 1728—and a number of new peripheral, communications, and software facilities.

B 1728 PROCESSOR: This new central processor, the fourth and largest in the B 1700 Series, offers from 65,536 to 262,144 bytes of MOS main memory, in 16,284-byte increments, and 6,144 or 8,192 bytes of control memory. The B 1728's instruction repertoire and internal speeds are the same as those of the B 1726 Processor; read cycle times are 667 nanoseconds per 24-bit access for the main memory and 167 nanoseconds per 16-bit access for the control memory. An expanded input/output control system can accommodate up to 14 I/O controls, each on a separate channel. The basic B 1728-1 Central System includes 8.1 million bytes of 20-millisecond head-per-track Systems Disk storage, expandable to 40.5 million bytes in 8.1-million-byte increments.

Monthly rental prices for typical B 1728 systems will range from about $5,300 to $12,500, with corresponding purchase prices ranging from $240,000 to $560,000. Customer deliveries are scheduled to begin in the third quarter of 1973.

PERIPHERAL EQUIPMENT: All input/output and mass storage devices previously announced for the B 1726 can also be used with the B 1728. In addition, Burroughs announced the availability of seven more I/O devices for use in either B 1726 or B 1728 systems: the 400-lpm B 9247-2 Train Printer, the 800-cpm B 9117 Card Reader, the 300-cpm B 9213 Card Punch, the 500/1000-char/sec B 9210 Paper Tape Reader, the 100-char/sec B 9220 Paper Tape Punch, the 18/50/72KC, 7-track B 9391 Magnetic Tape Unit, and the 96KB, 9-track B 9394-2 Magnetic Tape Unit. Prices were raised on a number of I/O controls and reduced on the 100-cpm B 9210 Card Punch and the 750-lpm B 9247-3 Train Printer. The high-performance B 9484-4 Disk Pack Drive Subsystem, usable in B 1728 systems only, can consist of two to six spindles with an on-line storage capacity of 87.6 million bytes per spindle; average head movement time is 30 milliseconds, average rotational delay is 12.5 milliseconds, and data transfer rate is 625,000 bytes per second. Prices of all the new and repriced B 1700 Series equipment are listed on the next page.

COMMUNICATIONS CONTROL: The new B 1351 Multi-Line Controller gives the B 1726 and B 1728 Processors a welcome capability to control multiple-line data communications networks. The basic B 1351 handles up to 8 lines, and the B 1352 MLC Extension (available only for the B 1728) permits a total of 16 lines to be controlled. Each line must be equipped with an appropriate line adapter. Initial deliveries of the B 1351 and B 1352 are scheduled for the first and third quarters of 1974, respectively.

COMMUNICATIONS SOFTWARE: To facilitate the development of communications control programs, Burroughs announced two new Program Products: 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.

CONVERSION AIDS: A new IBM 1401/1440/1460 Emulator and COFIRS II, an RPG to COBOL translator, should aid Burroughs in its primary sales mission of convincing users of small IBM computers to switch to the B 1700 Series. The emulator, available only for B 1726 and B 1728 Processors with at least 49K bytes of main memory and 4K bytes of control memory, will permit direct execution of most programs written for IBM 1401, 1440, or 1460 computers. Internal instructions will be executed two to three times as fast as on the original IBM systems, while I/O operations will normally be performed at peripheral speeds. The emulator runs on a stand-alone basis rather than under control of the B 1700 Master Control Program. COFIRS II converts source programs written in B 1700 RPG language (which is said to be "about 95% compatible" with IBM's RPG and RPG II) into COBOL source programs; it can be used on any B 1700 system with sufficient memory for COBOL compilation. □

Burroughs B 1700
EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-Year Lease)*
PROCESSOR AND MAIN STORAGE				
B 1728-1	Central System; includes 6,144 bytes of control memory, 65,536 bytes of main memory, I/O base, console and table, console printer and control, disk file control and electronics unit, and 8.1 million bytes of Systems Disk storage	181,688	415	3,825
B 1028-2	2,048 additional bytes of control memory	9,600	30	400
B 1097-3	Console Corner Table	720	0	15
B 1098	Processor Extension Cabinet	9,900	15	225
B 1305	I/O Expansion Feature (5 additional channels)	1,500	5	30
B 9374-17	Add-On Systems Disk module; 8.1 million bytes (max. of 4)	19,200	118	400
Main Memory Options for B 1728-1 Processor:				
B-1028-81	81,920 bytes total memory	11,000	12	250
B 1028-98	98,304 bytes total memory	19,800	25	450
B-1028-114	114,688 bytes total memory	28,600	37	650
B-1028-131	131,072 bytes total memory	37,400	49	850
B-1028-147	147,456 bytes total memory	46,200	61	1,050
B-1028-163	163,840 bytes total memory	55,000	73	1,250
B-1028-180	180,224 bytes total memory	63,800	85	1,450
B-1028-196	196,608 bytes total memory	72,600	97	1,650
B-1028-212	212,992 bytes total memory	81,400	109	1,850
B-1028-229	229,376 bytes total memory	90,200	121	2,050
B-1028-245	245,760 bytes total memory	99,000	133	2,250
B-1028-262	262,144 bytes total memory	107,800	145	2,450
PERIPHERAL EQUIPMENT				
B 9486-2	Dual Disk Pack Drive; 95.5 million bytes total	46,750	129	1,000
B 9484-4	Dual Disk Pack Drive; 175 million bytes total	63,380	201	1,610
B 9486-45	Single Disk Pack Drive Add-On Increment for B 9484-4; 87.5 million bytes	32,690	108	830
B 9486-4	Dual Disk Pack Drive Add-On Increment for B 9484-4; 175 million bytes total	57,380	177	1,460
B 1486	Disk Pack Control for B 9486-2 drives	45,600	143	950
B 1484-4	Disk Pack Control for B 9484-4 drives (B 1728 only)	45,600	108	950
B 1480	Disk Cartridge Control for B 9480	4,665	15	97
B 1481	Disk Cartridge Control for B 9481	4,665	15	97
B 9391	Magnetic Tape Unit; 18/50/72KC, 7 tracks	18,000	169	375
B 9394-2	Magnetic Tape Unit; 96KB, 9 tracks	20,400	174	425
B 1390	Magnetic Tape Control; 18/50/72KC, 7 tracks	6,960	38	250
B 1394-2	Magnetic Tape Control; 96KB, 9 tracks	12,300	40	300
B 1491	Magnetic Tape Control; 10KB, 9 tracks	10,368	30	216
B 9117	80-Column Card Reader; 800 cpm	9,000	43	250
B 1111	Card Reader Control for B 9111 & 9112	2,332	7	48
B 1115	Card Reader Control for B 9115, 9116, & 9117	2,160	8	45
B 9210	80-Column Card Punch; 100 cpm	12,000	70.20	250
B 9213	80-Column Card Punch; 300 cpm	25,440	145	530
B 1210	Card Punch Control for B 9210	4,320	14	90
B 1213	Card Punch Control for B 9213	4,320	14	90
B 1119	Card Reader Control for B 9119-1 (96-column)	2,332	7	48
B 1319	Card Reader/Punch Control for B 9319-2 & 9319-4	3,628	11	75
B 1419	Card Reader/Punch/Data Recorder Control for B 9419-2 & 9419-6	2,332	11	75
B 1120	Paper Tape Reader Control	1,800	9	50
B 9120	Paper Tape Reader; 500/1000 char/sec.	16,000	75.60	300
B 9926	Input Translator for B 9120	6,960	10.80	145
B 1220	Paper Tape Punch Control	2,100	19	60
B 9220	Paper Tape Punch; 100 char/sec.	15,300	70.20	260
B 9928	Output Translator for B 9220	6,850	10.80	124
B 9247-2	Train Printer; 400 lpm, 120 positions	19,500	100	460
B 9247-3	Train Printer; 750 lpm, 120 positions	33,000	138	710
B 1247	Printer Control for B 9247 Train Printers	4,320	14	90
B 9942-2	Additional 12 Print Positions for B 9247	2,000	10.80	40
B 9942-9	Additional Train Module for B 9247	3,500	18	65
B 9949-2	12-Channel Format Tape Reader for B 9247	3,050	15	61
B 1352	Multi-Line Controller (8 lines)	13,000	28	200
B 1353	Multi-Line Controller Extension (8 lines; for B 1728 only)	6,750	21	150

* Rental price includes equipment maintenance.

SOFTWARE PRICES

	Monthly License Fee
B 1700 Network Definition Language (NDL)	50
B 1700 User Programming Language (UPL)	200
B 1700 RPG to COBOL Translator (COFIRS II)	200
IBM 1401/1440/1460 Emulator	275