

Burroughs B 2800, B 3800, & B 4800

MANAGEMENT SUMMARY

The Burroughs B 2800, B 3800, and B 4800 systems were introduced in December 1975 as the first models of a new generation of computer systems designed to replace the company's "700 Series" of small, medium, and large-scale computer systems.

The new B 2800, B 3800, and B 4800 systems provided a preview of some of the important features that characterize the architecture of the new generation of Burroughs computers. Significantly, the central processor design does not deviate from that of the earlier B 2700/3700/4700 series of computers, assuring users of the earlier medium systems of complete protection of their software investment. The new processors, however, employ a new Burroughs-developed LSI circuitry called Burroughs Current Mode Logic (BCML), which provides up to a 50 percent reduction in central processor floor space requirements, higher central processor performance, and greater reliability. In terms of overall system performance, the new "800" systems yield from 1.5 to 4 times the performance of the earlier B 2700, B 3700, and B 4700 systems in multi-programming environments.

Architectural innovations in the new systems include an entirely new input/output subsystem based on the use of microprocessors to achieve distributed input/output processing, and special processors within the systems to assist in maintenance and diagnostic functions, to monitor environmental conditions, and to regulate the flow of data between main memory, the central processor, and the input/output subsystem.

The most significant performance enhancement in the "800 Series" processor is the new I/O subsystem composed of a series of LSI Data Link Processors (DLP's), a Burroughs trademark for the processors that are attached to each input/output channel and take the place of conven- ➤

The current Burroughs medium-scale computers are data base and data communications-oriented systems that were introduced in 1975 as compatible upgrades for the earlier B 2700, B 3700, and B 4700 systems. Burroughs has recently restructured the B 2800 and B 3800 lines by replacing four older models with four more cost-effective systems.

CHARACTERISTICS

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

MODELS: B 2800, B 3800, and B 4800 computer systems; see table on page 70C-112-09c for characteristics of the various processor models.

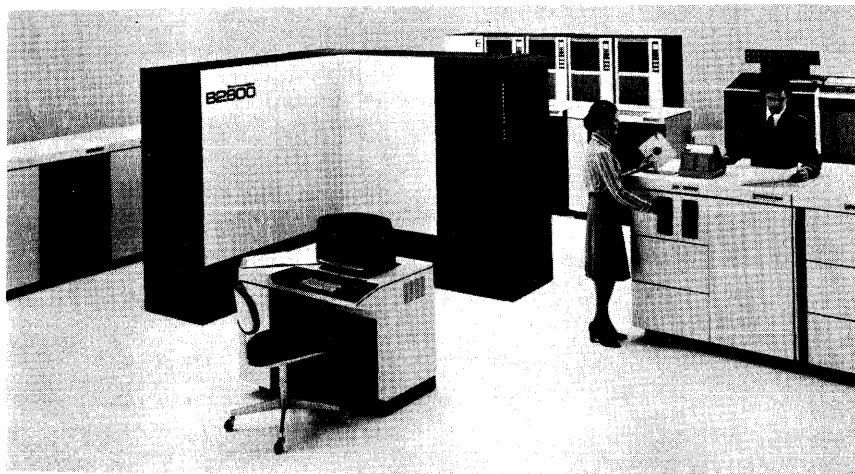
DATA FORMATS

BASIC UNIT: 16-bit word (plus parity bit). Each word can hold two 8-bit bytes or four 4-bit BCD digits. Main storage is addressable by digit position.

FIXED-POINT OPERANDS: Can range from 1 to 100 decimal digits or bytes for most instructions. Data in 4-bit format can be either signed (with 4-bit sign digit in leftmost position) or unsigned. Data in 8-bit format is always unsigned.

The optional Fixed-Length Floating-Point Arithmetic capability provides high-speed arithmetic operations on either "short" or "long" operands. Short operands have an exponent of 2 decimal digits plus sign and a fraction of 8 decimal digits plus sign. Long operands have an exponent of 2 digits plus sign and a fraction of 16 digits plus sign.

INSTRUCTIONS: May consist of from one to four 6-digit and/or 8-digit "syllables," a single 8-digit or 10-digit "syllable," or single 2-digit "syllable" consisting of an op code only. Each instruction can contain from 0 to 3 memory addresses. ➤



One of the two newest Burroughs B 2800 systems, the B 2815 offers processing speeds equivalent to those of the earlier B 2803 system. The B 2810 and B 2815 feature input/output systems that can contain both the newer "800 Series" Data Link Processor channels and the earlier "700 Series" IOC-type channels. The memory employed in these two systems is built from 4K-bit chips. The basic B 2815 system with 125K bytes of memory is priced at \$4,565 per month on a 1-year lease, including 24-hour, 7-day maintenance coverage. Purchase prices for the B 2815 start at \$172,200.

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➤ tional control units for attaching peripheral devices to the system. The Data Link Processors execute input/output commands independently of central processor operations and have a separate path to main memory through the Memory Control hardware. Each Data Link Processor is specialized for controlling a particular type of peripheral device, including an appropriately sized buffer, and transmits data to the central system at the message level. Thus, depending on the number of channels available for each central processor model, these systems can have from 8 to 128 DLP-based I/O processors controlling input/output traffic in parallel with central processor operations.

The "800 Series" computers are targeted for environments with extensive data base/data communications requirements. Both single and dual-processor models are provided to assure continuous system availability. The original announcement also included a selection of new high-performance fixed-head disks and removable disk pack drives, which can be shared by multiple processors and accessed through multiple data paths, to provide attractively priced random-access storage to house users' data bases. Software support includes Burroughs' highly regarded DMS-II data base management system, a COBOL-74 compiler with interfaces to DMS-II, and the Network Definition Language to facilitate communications programming, plus a new version of the MCP operating system with multiprogramming support for up to 256 user jobs.

Recently, Burroughs has radically restructured the B 2800/3800/4800 line through the addition of six new models and the subsequent replacement of four original models.

The restructuring actually took part in three stages, beginning in August 1976, when Burroughs quietly expanded the B 2800 line by releasing the B 2802 and B 2803 models. These two "new" systems were not "800" systems like the ones that had been unveiled in the December 1975 introduction of the new line. The 2-megahertz B 2802 and 3-megahertz B 2803 systems were actually remnants of Burroughs earlier "700" systems and represented improved versions of the older design. Despite the "800" designation, the B 2802 and B 2803 processors (like the earlier B 2700, B 3700, and B 4700 systems) are implemented in Complementary Transistor Logic (CTL) circuitry instead of the faster and denser Burroughs Current Mode Logic that was one of the keynote developments announced with the "800" line. Another significant "800" improvement that was not included in the B 2802 and B 2803 systems is the new I/O subsystem based on the Data Link Processors. Instead, the older "700-type" Input/Output Controllers (IOC's) are used in the two new systems.

The next two stages in the restructuring occurred in the summer of 1977, with the June announcement of the new B 2810 and B 2815 systems and the August introduction of the new B 3834 and B 3835 systems.

The B 2810 and B 2815, like the B 2802 and B 2803, are 2-megahertz and 3-megahertz processors, respectively, and ➤

➤ **INTERNAL CODE:** EBCDIC (standard) or ASCII, depending upon the setting of a mode flip-flop.

MAIN STORAGE

STORAGE TYPE: Metal oxide semiconductor (MOS) in the B 2802, B 2803, B 2803-2, B 2810, B 2815, B 3834, B 3834-2, and B 3835; bipolar semiconductor in the B 4840, B 4841, and B 4842 (see table).

CAPACITY: See table and price list.

CYCLE TIME: See table.

CHECKING: Main memory for all central processor models includes a "self-correcting" feature that automatically corrects single-bit memory errors.

STORAGE PROTECTION: Provided by a base register and a limit register. The high-order three digits of generated memory addresses are checked to ascertain that they fall within the range defined by these two registers.

CENTRAL PROCESSORS

The B 2802, B 2803, B 2810, B 2815, B 3834, B 3835, and B 4840 systems contain one central processor, while the B 2803-2, B 3834-2, and B 4842 systems contain two central processors, each with its own main memory and I/O subsystem. The B 4841 is an add-on processor that is functionally identical to the B 4840 and is used to upgrade the uni-processor system to the dual-processor B 4842. Each central system includes a memory control feature which operates independently of the central processor and controls the transfer of data between the central processor, main memory, and the I/O subsystem. The I/O subsystem receives highest priority for accessing main memory.

Each central processor includes a Snap Processor, a special-purpose processor that monitors the status of all circuitry in the central processor during the test mode of operation. Software for the Snap Processor compares the test results with standard test results recorded at the time of manufacture of the central processor in order to detect malfunctions at the circuit level. A software system is also provided that permits specially designed tests to be run on the Snap Processor to assist in the isolation of intermittent processor malfunctions.

The B 2810, B 2815, all B 3800, and all B 4800 processors also include an automatic environmental monitoring system that measures computer room temperatures and humidity, monitors the computer system power supply, and on the B 3800's and B 4800's, maintains logs on these environmental conditions. The systems illuminate a warning light on the central processor and, on the B 3800/4800 processors, issue messages at the Operator Control Station when a temperature rise to a predetermined level is detected and store processing programs and data and bring the system to an orderly shutdown if the temperature rises to an intolerable level. The system also records fluctuations in the power supply and issues warnings of potential "brown-out" conditions.

INDEX REGISTERS: Three 8-digit index registers for each program are stored in reserved main memory locations.

INDIRECT ADDRESSING: Can be specified within the first digit of any instruction address field. If specified, the indicated memory location is considered to hold the address of the required operand rather than the operand itself. Multi-level indirect addressing to any depth is possible.

INSTRUCTION REPERTOIRE: The standard instruction set includes instructions for arithmetic, comparison, and data movement operations on variable-length operands in either 4-bit numeric or 8-bit alphanumeric code. Included ➤

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CHARACTERISTICS OF THE B 2800, B 3800, & B 4800 SYSTEMS

	B 2802	B 2803	B 2803-2	B 2810	B 2815	B 3834	B 3834-2	B 3835	B 4840/1	B 4842
CENTRAL PROCESSORS										
No. of processors	1	1	2	1	1	1	2	1	1	2
Processor cycle time, nsec.	500	333	333	500	333	250	250	250	125	125
Processor circuit technology	CTL	CTL	CTL	CTL	CTL	BCML	BCML	BCML	BCML	BCML
Relative performance level	1.0	1.25	2.25*	1.15	1.45	1.90	3.40*	2.40	4.50	8.30*
MAIN STORAGE										
Type	MOS	MOS	MOS	MOS	MOS	MOS	MOS	MOS	Bipolar	Bipolar
Memory chip size, bits	1024	1024	1024	4096	4096	1024	1024	4096	1024	1024
Cycle time, nanoseconds	650	650	650	650	650	500	500	500	250	250
Minimum capacity, bytes	100,000	100,000	200,000	125,000	125,000	100,000	200,000	500,000	100,000	200,000
Maximum capacity, bytes	500,000	500,000	1,000,000	500,000	500,000	500,000	1,000,000	1,000,000	1,000,000	2,000,000
Increment size, bytes	50,000	50,000	50,000	125,000	125,000	50,000	50,000	250,000	100,000	100,000
Bytes fetched per cycle	2	2	2	2	2	2	2	2	2	2
Error correction	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
I/O CONTROL										
No. of I/O channels, maximum	20	20	40	24	24	32	64	40	64	128
No. of DLP channels	0	0	0	16 to 24	16 to 24	16 max.	32 max.	16 to 40	16 to 64	32 to 128
No. of IOC channels	8 to 20	8 to 20	16 to 40	8 max.	8 max.	16 max.	32 max.	16 max.	16 max.	32 max.
Typical monthly rental, 5-year lease**	\$3,515	\$4,445	\$9,855	\$3,505	\$4,515	\$6,625	\$2,650	\$8,380	\$14,330	\$21,280

* Estimated value.

**Includes 24-hour maintenance.

➤ are implemented in CTL circuitry. Unlike the B 2802 and B 2803, the B 2810 and B 2815 permit attachment of the Data Link Processors as well as the "700-type" Input/Output Controllers.

The B 2810 and B 2815 main memory, while similar in capacity to the B 2802 and B 2803 memory, employs 4096-bit memory chips instead of the 1024-bit chips employed in the earlier systems. This difference in memory construction makes the B 2802/3 processors more cost-effective for systems that are not expected to exceed the 200K to 250K-byte range and the B 2810/15 processors more economical for systems with main memory sizes ranging from 250K to the maximum 500K bytes.

The B 2810 and B 2815 systems also feature a new modular power supply that reduces configurations by one cabinet, yielding reduced space requirements and, more importantly, reduced system costs. The two newest B 2800's are intended for use in systems that function in mixed environments consisting of both on-line, transaction-oriented applications and batch-oriented multiprogramming applications.

At the time of the B 2810/15 announcement, Burroughs also reduced the lease and purchase prices for the B 2802 by 28 percent. The B 2803 lease and purchase prices were lowered by 28 and 23 percent, respectively, and the lease and purchase prices for the dual processor B 2803-2 system were reduced by 24 and 17 percent, respectively.

The new B 3834 and B 3835 systems, unveiled in August 1977, provided the most sweeping revision by completely displacing all the previous B 3800 models—the B 3830, the add-on B 3831, and the dual-processor B 3832 system. ➤

➤ are 3-address add, subtract, multiply, and divide commands and 2-address add and subtract commands, as well as conventional edit, search, and translate instructions. Binary arithmetic is not available, but logical AND, OR, and NOT instructions are included.

Floating-point decimal arithmetic, an optional feature, includes a set of floating-point instructions that use fixed-length operands for efficient operation.

A number of standard instructions, including Initiate I/O, are "privileged" and may not be used in normal user-written programs.

INPUT/OUTPUT CONTROL

Each central processor includes one or two input/output subsystems which control the movement of data between main memory and the system input/output devices. On all B 2800/3800/4800 systems except the B 2802, B 2803, and B 2803-2, individual peripheral devices operate under control of Data Link Processors, which are associated with each input/output channel. Each Data Link Processor is designed to control a particular type of peripheral device and contains one or two record-length buffers to minimize contention for accesses to main memory.

The Data Link Processors are housed in the central processor on a Data Link Base, which contains 34 card positions and a power supply sufficient to handle 8 Data Link Processors. Although the maximum number of Data Link Processors per base is always 8, the exact number of Data Link Processors that can be housed in one Data Link Base is determined by the number of cards required by the individual DLP's, as signified in each DLP's numeric suffix, and cannot exceed 34 for each plane. Data Link Processors are supplied for all new peripheral devices announced for the B 2800/3800/4800 systems and for many of the peripherals previously released for B 2700/3700/4700 systems.

An optional 8-Channel I/O Cabinet provides eight input/output channels of the conventional B 2700/3700/4700 type; these channels can be used to connect older B 2700/3700/4700 peripherals to B 2800/3800/4800 systems through ➤

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▷ Instead, the B 3800 line now consists of the B 3834, the dual-processor B 3834-2, and the B 3835. These successor systems are built around a 4-megahertz BCML processor and can utilize the older "700-type" IOC's as well as the newer DLP's. Memory makes the major difference between the two systems: up to 500K bytes of memory built from the older 1024-bit chips for the B 3834, and up to 1000K bytes of memory built from 4096-bit chips in the B 3835. Applications for the B 3800's include a mixed environment of interactive processing combined with data communications and batch processing while maintaining large data bases.

The B 3834/5 systems, including the dual-processor B 3834-2, immediately obsoleted the previous B 3800 line by virtue of their increased cost-effectiveness. The B 3834 system, with its improved performance, is priced about \$5,000 below the earlier B 3830. As a result, concurrently with the announcement of the B 3834/5 systems, Burroughs announced the discontinuance of the B 3830, the B 3831 add-on system, and the B 3832 dual-processor system, as well as the original B 2800 system, the B 2830.

The B 4800 series appears to be the only part of the Burroughs' medium-system line that the company feels comfortable with and has left unchanged as of this writing. The B 4840, B 4841, and B 4842 systems introduced as part of the original medium-systems announcement in December 1975 are still actively marketed today, and appear to be the most popular of the three lines.

Despite all the references to the B 2700 systems in the past tense, that older product line is still marketed on an as-available basis in the form of five specialized, industry-oriented packaged systems. The five systems are designated the B 2734 Production Control System, the B 2742 Commercial Bank MICR System, the B 2776 Thrift Industry System, the B 2777 Wholesale Management System, and the B 2778 Medical Management System. Detailed descriptions of these specialized systems, including software, are provided in the Equipment Prices section of this report.

THE B 2800/3800/4800 PROCESSORS

The revised B 2800, B 3800, and B 4800 Series now consists of 11 central processor models—five B 2800's, three B 3800's, and three B 4800's.

The smallest, the B 2802, is a single-processor system that includes a central processor with a 500-nanosecond cycle time and from 100,000 to 500,000 bytes of MOS error-correcting memory, expandable in 50K-byte increments. The cycle time for the main memory is 650 nanoseconds to access two bytes. The B 2802 I/O subsystem includes eight IOC ("700-type") I/O channels, expandable to 12 within the memory and I/O cabinet. One optional I/O cabinet containing eight additional channels can also be added to the system. The aggregate data throughput rate of a basic 8-channel B 2802 system is 1.5 million bytes per second. Through the addition of an optional DLP multiplexer, this rate can be increased to 3 million bytes per second. ▷

▶ standard Input/Output Controllers (IOC's). Each 8-Channel I/O Cabinet can accommodate five Type B channels plus three Type A channels. See the table for the maximum number of optional 8-Channel I/O Cabinets that can be configured with each central processor. The combined number of DLP channels and conventional (IOC) input/output channels cannot exceed the maximum number of input/output channels specified for each central processor.

The B 2802, B 2803, and B 2803-2 systems use the older "700-type" Input/Output Controllers (IOC's) in place of the Data Link Processors described above.

Please see the table on page 70C-112-09c for the I/O channel complements of each of the B 2800/3800/4800 systems.

SIMULTANEOUS OPERATIONS: One input or one output operation on each installed DLP input/output channel or B 2700/3700/4700-type channel can occur simultaneously with computing. Maximum input/output data rates for each processor are shown in the table.

MASS STORAGE

B 9470 HEAD-PER-TRACK FILES: These new fixed-head disk files, announced in December 1975 for use with B 2800/3800/4800 systems, provide very fast access to up to 472 million bytes of data per subsystem. The disk units use non-interchangeable disks and have a fixed read/write head serving each data track. The B 9470-1 Primary Storage Module and B 9470-2 Add-On Storage Module record data in 100-byte sectors, and have a capacity of 5.5 million bytes per disk drive.

The basic B 9470 subsystem includes one B 9470-1 Primary Storage Module, which contains a power supply and air system and one disk drive with 5.5 million bytes of storage. The B 9470-1 can accommodate one B 9470-2 Add-On Storage Module with a capacity of 5.5 million bytes. Additional expansion of the subsystem can be achieved by adding additional B 9470-1 Primary Storage Modules and associated B 9470-2 Add-On Modules. One B 9471-6 Disk Electronics Unit is required for every four disk storage units; the DEU includes circuitry to support Angular Position Sensing, in which I/O requests are serviced according to read/write head position to optimize performance, and the capability to detect the loss of up to 11 bits in a transfer of one 100-byte sector.

Each B 9470 disk unit has a rotational speed of 10 milliseconds and an average access time of 5 milliseconds. Data transfer rate for all models is 650K bytes per second. A maximum of eight data paths from one or several systems can be accommodated by each B 9470 subsystem. The disk unit can be connected to a computer either directly through a disk control or Data Link Processor or through a B X377-6 Basic Exchange which permits up to four disk controls to address up to four B 9471-6 Disk Electronics Units. The Basic Exchange can be expanded into 8 x 8, 8 x 12, 8 x 16, and 8 x 20 configurations in order to achieve the maximum subsystem capacity of 471 million bytes. The B 9470 Head-Per-Track Subsystems can be used in conjunction with the File Protect Memory to permit multiple programs to share a common head-per-track subsystem. Customer shipments of the B 9470 subsystems for B 2800/3800/4800 systems began during the second quarter of 1977.

The read/write heads are implemented using a new Burroughs integrated head technology, in which all of the functional components of a conventional read/write head are manufactured as one monolithic structure. Burroughs states that the new technology produces read/write heads that are more reliable and permits increased recording densities. ▶

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▷ Monthly rental rates for the basic B 2802 system range from \$2,635 per month on a 1-year lease to \$2,155 per month on a 5-year lease. Under Burroughs' new policy, all lease prices include 24-hour, 7-day maintenance service. Purchase price for the basic B 2802 system \$92,440.

The B 2803 is a 333-nanosecond processor system similar to the B 2802. It includes 100,000 to 500,000 bytes of error-correcting memory and the same I/O subsystem. Monthly rental rates for this higher-performance B 2800 system range from \$3,765 per month on a 1-year lease to \$3,085 per month on a 5-year lease. Purchase price for the B 2803 is \$139,220. Memory increments of 50,000 bytes for both systems are priced between \$435 and \$355 per month on lease and at \$15,000 on purchase.

A dual-processor system, the B 2803-2, includes two basic B 2803 systems plus File Protect Memory and is priced at \$9,120 on a 1-year lease, \$7,845 on a 5-year lease, and \$344,940 on purchase.

The B 2810 and B 2815 systems bear the same relationship to each other as the B 2802 and B 2803. The B 2810 features a 500-nanosecond cycle time, and the B 2815 has a 333-nanosecond cycle time. In all other respects, the two systems are identical. Memory for the B 2810/15 systems ranges from 125,000 to 500,000 bytes of MOS error-correcting memory, expandable in 125,000-byte increments. The memory employed in these two new systems is built from 4096-bit chips, resulting in denser and less costly memories than in the B 2802/3. The B 2810/15 I/O subsystem includes eight DLP channels in the basic system, expandable to a maximum of 24 channels. In addition, up to eight of the 24 channels can be the older "700-type" IOC's.

The basic B 2810 system, with 125,000 bytes of memory, eight DLP channels, and an operator console, is priced at \$3,505 on a 5-year lease and \$152,860 on purchase. A basic B 2815 in the same configuration is priced at \$4,515 per month on a 5-year lease and at \$197,660 on purchase.

The B 3834 and B 3835 both feature 250-nanosecond processors but differ in both memory and I/O channel capacities. The B 3834 memory is built from 1024-bit chips and ranges from 100,000 bytes in the basic system to a maximum of 500,000 bytes. Cycle time for the B 3834 memory is 500 nanoseconds for a 2-byte fetch, and memory increments are 50,000 bytes. The B 3834 I/O subsystem consists of 16 DLP channels in the basic system and can be expanded only through the addition of 16 IOC channels. Prices for the B 3834 basic system range from \$5,580 per month on a 1-year lease to \$4,990 per month on a 5-year lease. Purchase price for the minimum system is \$219,560.

As with the B 2803, a dual-processor B 3834 system, designated the B 3834-2, is available. The B 3834-2 includes two complete B 3834 basic systems plus File Protect Memory and is priced at \$11,690 per month on a 1-year lease, \$9,440 per month on a 5-year lease, and \$457,570 on purchase. ▷

▶ **B 9383 DISK PACK DRIVE SUBSYSTEMS:** These dual-spindle disk pack drives provide from 174.4 million to 1.395 billion bytes of on-line removable disk pack storage per subsystem for B 2800/3800/4800 systems. Three models of the B 9383 subsystem are available, featuring two independent disk pack drives per module and either single- or dual-access control units. The B 9383-6 Disk Pack Drive Subsystem includes a single controller and from one to four dual drives for a total of from 174.4 to 697.6 million bytes; disk drive control or DLP is required with this configuration. The B 9383-7 subsystem features a dual controller and from one to four dual drives, and requires two disk drive control units or DLP's. The minimum B 9383-8 subsystem includes a dual controller and five dual drives, and is expandable to eight dual drives for a total of from 872 million to 1.395 billion bytes of disk storage: two disk drive control units or DLP's are required. The B 9486-4 Dual Drive Increment can be added to a B 9383-6, B 9383-7, or B 9383-8 subsystem to achieve modular storage capacities.

Each 11-high disk pack contains 87.2 million bytes and is physically compatible, but not format-compatible, with the IBM 2316 Disk Pack. Data is recorded in 180-byte segments. Average arm movement time is 30 milliseconds, average rotational delay is 12.5 milliseconds, and data transfer rate is 625,000 bytes per second. Error detection and correction are provided by a block-count check byte (a count of "one" bits for each 180-byte segment) and an 11-bit checking work appended to each 90 bytes of user data. All single-bit errors are detected and corrected, and all multiple-bit errors are detected.

B 9383-16, -17, AND -18 DISK PACK DRIVE SUBSYSTEMS: Announced in December 1975 for use with B 2800/3800/4800 and B 6700/7700 systems, these disk drives provide very large quantities of on-line storage in removable disk pack drives. The B 9383-16 Disk Storage/Controller includes a single-channel programmable controller and one dual disk pack drive with a storage capacity of 348.8 million bytes. The B 9383-17 Disk Storage Controller consists of a dual-channel programmable controller and one dual disk pack drive, also with a capacity of 348.8 million bytes. Both the B 9383-16 and B 9383-17 can accommodate up to three additional B 9484-8 Dual Drive Increments, each with a capacity of 348.8 million bytes, for a total subsystem storage capacity of 1.4 billion bytes. The B 9383-18 Disk Storage/Dual Controller Disk-Pack Drive Subsystem includes a dual-path programmable controller and five dual disk pack drives that provide a basic capacity of 1.7 billion bytes of storage. The B 9383-18 can be expanded through the addition of three B 9484-8 Dual-Drive Increments, each with a capacity of 348.8 million bytes, to achieve a total subsystem storage capacity of 2.8 billion bytes.

The B 9383-16, -17, and -18 subsystems use the B 9974-7 Disk Pack, which contains 11 platters and 20 recording surfaces for user data. Each working surface of the disk pack contains prerecorded information to identify the location of each data track on the surface, enabling the same read/write head to read the head positioning data and perform the read/write operation. This head positioning technique is designed to eliminate errors caused by head misalignment or thermal gradients and to facilitate interchangeability of disk packs with high bit densities. Data is recorded in 180-byte segments at a density of 4400 bits per inch.

Each disk pack has a data storage capacity of 174.4 million bytes. For all three B 9383 models, the average access time is 30 milliseconds, average rotational delay is 12.5 milliseconds, and data transfer rate is 625,000 bytes per second. The field-installable B 9984 Dual Port Feature permits each dual drive to be accessed by two dual-channel control units to provide throughput equivalent to that of a ▶

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▷ The B 3835 memory is built from 4096-bit chips and ranges from 500,000 bytes in the basic system to 1 million bytes, expandable in 250,000-byte increments. Memory cycle time for the B 3835, like that of the B 3834, is 500 nanoseconds per 2-byte fetch. The 3835 I/O subsystem is more flexible than that of the B 3834; it starts with 16 DLP channels in the basic system and is expandable to 40 channels, of which 16 can be the older IOC channels. Pricing for the B 3835 basic system ranges from \$8,870 per month on a 1-year lease to \$7,265 per month on a 5-year lease. Purchase price for the basic system is \$305,800.

B 4800 systems are also available in three models, one of which is a dual-processor configuration. These systems incorporate the earlier B 4790 central processor along with the new B "800 Series" input/output system. The central processor has a cycle time of 125 nanoseconds and from 300,000 to 1,000,000 bytes of error-correcting bipolar memory, with a cycle time of 250 nanoseconds for two bytes of data. Each input/output subsystem can have from 16 to 64 channels and has an aggregate data transfer rate of 8 million bytes per second. In addition, a maximum of two 8-channel I/O cabinets can be substituted for up to 16 input/output subsystem channels for attachment of peripheral units which use conventional control units instead of the new Data Link Processors.

Typical B 4800 systems rent for \$19,500 to \$85,500 per month and have purchase prices ranging from \$850,000 to \$2,725,00.

NEW PERIPHERALS

The B "800 Series" computer systems are designed to provide users of Burroughs medium-scale equipment with advanced data base/data communications capabilities. To support their performance in these environments, Burroughs has supplemented them with a series of direct-access storage facilities that feature large storage capacities, fast access to data, and attractive price/performance.

The B 9470, newest of Burroughs' broad line of head-per-track disk files, comes in four models, all of which feature an average access time of 5 milliseconds—four times faster than earlier head-per-track disk files—and a data transfer rate of 650,000 bytes per second. The B 9470-1 and add-on B 9470-2 disk files record data in 100-byte sectors and have a capacity of 5.5 million bytes per disk file, while the B 9470-11 and add-on B 9470-12, which are also available for the large-scale B 6800 and B 7800 systems, record data in 180-byte sectors and have a capacity of 5.9 million bytes per disk file. The maximum subsystem capacity is 472 million bytes, and the information can be accessed by up to eight Data Link Processors from one or multiple processors with the fully expanded exchange capability. The B 9470 Head-Per-Track Disks feature a number of reliability features, including the capability to detect the loss of bursts of up to 11 bits out of each sector transmitted and new monolithic read/write heads.

Two new removable disk-pack drives were also announced in December 1975 for on-line storage of larger amounts of

▶ 4 x 8 or 4 x 16 disk pack drive subsystem. Other standard features include overlapped seek operations on up to 16 spindles and automatic detection and correction of error bursts of up to 11 bits. The B 9383 Disk Pack Drive Subsystems were first delivered in November 1977.

One B X304-8 Disk Pack DLP-4 Data Link Processor or B X304-1 Control is required for a B 9383-16 subsystem, and two B X304-8 DLP-4's or B X304-1's are required for each B 9383-17 and B 9383-18 dual-controller subsystem.

B 9387 and B 9484-5 DISK PACK DRIVE SUBSYSTEMS: These medium-capacity disk pack drives have a capacity of 65.2 million bytes per spindle and a total storage capacity of 1.04 billion bytes in a subsystem with the maximum of 16 spindles. The average access time is 25 milliseconds, average rotational delay is 8.3 milliseconds, and data transfer rate is 605K bytes per second.

The entry-level B 9387-1 subsystem includes a 1 x 4 controller and a dual disk drive with a capacity of 130.4 million bytes in the 180-byte sector mode. One additional B 9484-5 dual drive can be connected to the B 9387-1 for a maximum subsystem capacity of 260.8 million bytes.

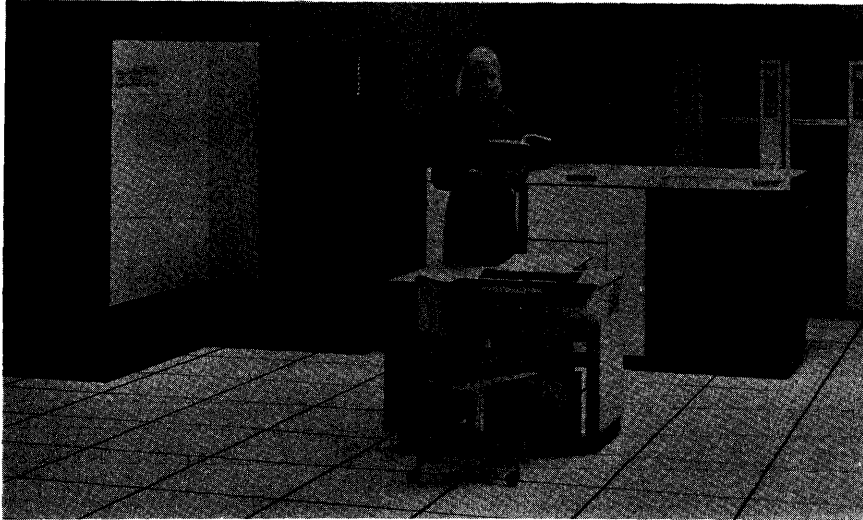
B 9484-5 subsystems with more than four spindles require a B 9387-2 programmable controller, which can control up to four B 9484-5 dual drives. A B X387-5 Disk Pack Drive Basic Exchange allows two B 9387-2 controllers to access four dual drives. Additional B X387-6 Port Expansion Adapters permit the attachment of two additional B 9387-2 controllers to the subsystem, up to a maximum of eight controllers. The Basic Exchange can also be expanded by adding B X387-8 and B X387-7 Exchange Expansion Adapters to increase the total number of spindles per subsystem to a maximum of 16.

The B 9484-5 Dual Drives use the B 9974-5 Disk Pack, which contains five disk platters and provides five surfaces for user data and one surface for head guidance information. Each disk pack contains 814 user cylinders and one maintenance cylinder, with five tracks per cylinder. There are 90 sectors of 180 bytes each per track. A Track Following Servo feature permits the track alignment reference information to be placed in the disk pack to achieve greater head positioning accuracy. Other reliability features incorporated in the disk drive include Programmed Data Offset and Variable Strobe to facilitate recovery of marginal data, a Contamination Control System to provide a closed filtered air system, and modular construction of the units to facilitate maintenance. The B 9387-1 and -2 Controllers also generate error detection codes that can detect 11-bit error bursts during the transfer of a 180-byte sector and can automatically retry transmission of the sector.

FILE PROTECT MEMORY: This feature permits multiple programs, residing in either single or multiple processors, to share a common data base stored on Burroughs head-per-track disk files or disk pack drives. The feature makes it possible to "lock" specific disk record addresses, thus guarding against the errors that can occur when one program attempts to access a data record while it is being updated by another program.

The basic File Protect Memory (FPM) consists of a series of registers and sixteen 40-bit words of memory, permitting simultaneous locking of up to 16 disk record addresses. Up to 7 additional 16-word modules of FPM can be added, for a total capacity of 128 words. The FPM can interface into as many as four Disk File Controls, enabling up to four processors to share a common data base. All processors also share a common MCP residing on disk, a common File Directory, and a common Disk Available Table.

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The new Burroughs B 3834 system employs 1K-bit memory chips, whereas its more powerful companion system, the B 3835, employs 4K-bit memory chips, providing more economical systems with memory above 250K bytes. The new B 3800's can also intermix the newer Data Link Processor Channels with the earlier IOC channels. The B 3834 can support up to 32 channels, while the B 3835 can have up to 40 channels. Prices for a basic B 3834 system with 100K bytes of memory start at \$5,580 per month on a 1-year lease. Purchase prices begin at \$219,560.

▷ information. The B 9484 Dual Disk Storage subsystems offer from 130.4 million to 1.04 billion bytes of storage per subsystem with an average access time of 33.3 milliseconds and a data transfer rate of 605,000 bytes per second. Each removable disk pack has a formatted capacity of 65.2 million bytes and contains the track alignment data required for a new servo positioning technique designed to provide superior head positioning accuracy. The minimum system consists of a B 9387-1 Dual Disk Drive and Controller, with a capacity of 130.4 million bytes; this can be expanded by the addition of one B 9484-5 dual-drive increment to a maximum of four spindles and 260.8 million bytes. Larger subsystems must include one or more B 9387-2 Controllers and can be expanded to control a maximum of 16 spindles addressed by up to 8 controllers.

Direct-access storage for very large quantities of information is provided by the new B 9383-16, -17, and -18 Disk Storage Subsystems, also announced in December 1975, which use a removable disk pack with a formatted capacity of 174.4 million bytes of data. The B 9383-16 Disk Storage/Single Controller Subsystem and the B 9383-17 Disk Storage/Dual Controller Subsystems both have a capacity of from 348.8 million bytes to 1.4 billion bytes, while the very large B 9383-18 subsystem consists of dual controllers and from five to eight dual drive units with an on-line storage capacity of up to 2.8 billion bytes. All three models feature an average access time of 42.5 milliseconds and a data transfer rate of 625,000 bytes per second. Each dual drive can be equipped with a Dual Port Feature, which allows two dual controllers to access each drive and up to four channels to address the subsystem maximum of 16 spindles.

Like the B 9484 Disk Pack Drives, the large-capacity B 9383 Disk Pack Drives incorporate a servo positioning system in which head positioning information is pre-recorded between data sectors on each disk pack to ensure accurate head positioning for disk packs with high recording densities. These disk drive subsystems also feature overlapped seeks on up to 16 spindles and automatic detection and correction of error bursts of up to 11 bits. ▷

▶ File Protect Memory is a standard component of all multiple-processor systems and of the B 4841 upgrade processor.

INPUT/OUTPUT UNITS

AUDIT ENTRY DATA PREPARATION SYSTEMS: The Burroughs AE systems are minicomputer-based systems that edit, validate, and capture ready-to-process data on magnetic tape cassettes, industry-compatible floppy disks, or Burroughs Super Minidisks for batch transmission to a host computer. Errors are detected and corrected at the point of original entry. The AE systems simultaneously print an audit journal to assist the operator and to permit subsequent auditing.

There are currently four audit entry data preparation system models although only one model, the AE 412, is offered for use with the medium systems. The AE 501 system is the oldest entry in the current line, having been announced in September 1975. The AE 412, AE 511, and AE 513 were all introduced in November 1976 and were first delivered in the second quarter of 1977.

All AE systems include a 28K processor, a standard Burroughs alphanumeric keyboard, a separate 10-key numeric pad, special function keys, and 16 program select keys. All systems have a data communications capability and can have up to twice the data storage capacity of the basic system.

The AE 412 also includes a 60-cps matrix printer, a Burroughs Self-Scan 240-character visual display panel, and a 243,000-byte industry-compatible floppy disk drive.

The AE 412 systems can communicate in either 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 systems include Burroughs Basic Mode, Point-to-Point Batch, and the bit-oriented Burroughs Data Link Control (BDLC) procedures.

B 9390 SERIES MAGNETIC TAPE UNITS: These units record data on 1/2-inch tape in IBM-compatible formats. Each tape drive is housed in a separate cabinet of the conventional vertical type. Pinch rollers and vacuum-column buffers are employed. Tape can be read in either the forward or reverse direction. Up to 10 free-standing tape drives can be connected to a Tape Control. Simultaneous read/write operations are possible if two Tape ▶

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➤ A new high-speed printer was also added to the B "800" medium systems product line-up. The B 9247-15 Train Printer operates at 1500 lines per minute with a standard 48-character set, and also offers optional 72- or 96-character print trains. The new printer also features enhanced forms positioning and control features, including an Electronic Forms Control Buffer, automatic detection of forms-related printing interruptions, and a powered forms stacker to automatically stack a full box of paper.

In addition to these new high-performance peripherals, Burroughs is also offering a selection of Data Link Processors for attachment of selected B 2700/3700/4700 peripheral units to the B "800 Series" central processors. These include the B 9247 Line Printers, the B 9115, B 9116, and B 9117 Card Readers, the B 9495 and B 9496 Magnetic Tape Units, and the B 774 and B 874 System and Communications Processors. In addition, other peripheral units originally available with B 2700/3700/4700 systems can be transferred to the B "800 Series" processors by substituting an optional 8-Channel I/O Cabinet to provide channels for peripheral devices that are attached to the system through standard input/output controllers.

SOFTWARE

An important feature of the B 2800, B 3800, and B 4800 systems is object-code-level software compatibility with the earlier B 2700, B 3700, and B 4700 medium-scale computers. As a result, purchasers of the new systems can expect to have full use of all the software and applications programs developed for the earlier Burroughs medium-scale computers plus some important new facilities, including the sophisticated DMS-II data base management system.

Operating system support is centered around the Master Control Program, the comprehensive operating system originally developed for the B 2700/3700/4700 systems. A substantial revision of the MCP, MCP VI-6.0, with facilities for supervising the concurrent execution of up to 256 user programs, released in August 1976.

MCP VI incorporates Burroughs' unique implementation of virtual memory, in which system compilers automatically divide programs into logical segments so that only the main segment of the program must reside in main memory throughout program execution. Other segments of the program are brought into main memory as overlays from disk storage as they are required. MCP VI-6.0 also supports systems configured with the maximum 1,000,000 bytes of main memory. Other features of MCP VI-6.0 include a comprehensive system audit and security system, the Time Analysis and Billing System (TABS) for allocating costs of computer usage, and the Workflow Management System, an extension of the MCP job control language that provides sophisticated facilities for controlling and scheduling the computer workload.

MCP VI-6.1, released early in 1977, provided two important new software facilities for Burroughs medium-system users, the DMS-II data base management system and an ANS-74 COBOL compiler. Originally announced in ➤

➤ Controls and an Exchange unit are employed. Only two models of the B 9390 series tape units are currently offered to provide compatibility with 7-track and 800-bpi 9-track magnetic tapes:

B 9391: 7 tracks; 200/556/800 bpi; 90 ips; 18,000, 50,000, or 72,000 char/sec.

B 9392: 9 tracks; 800 bpi; 90 ips, 72,000 bytes/sec.

B 9495-5 & B 9495-6 MAGNETIC TAPE UNITS: These high-performance 9-track units record data on 1/2-inch tape in IBM-compatible phase-encoded mode at 1600 bpi. The B 9495-5 has a tape speed of 200 ips and a data transfer rate of 320,000 bytes/second, while the B 9495-6 has a tape speed of 250 ips and a data transfer rate of 400,000 bytes/second. Both models have a rewind speed of 700 ips, enabling a 2400-foot reel to be rewound in less than 45 seconds. Both drives feature a single vacuum-driven capstan, a sealed tape-path chamber, a power access window, a positive reel latch, automatic tape threading and loading, and "on-the-fly" detection and correction of most errors. A unique "coaxial" hub mounts the feed reel directly in front of the tape-up reel, reducing the overall width of the unit to just 24 inches. These units can be used with any B 2800/3800/4800 computer in a subsystem consisting of up to 4 tape controls, up to 16 tape units, and an appropriate Master Electronic Exchange (1 x 4, 1 x 8, 2 x 8, 2 x 16, 3 x 16, or 4 x 16).

B 9495-2 & B 9495-3 MAGNETIC TAPE UNITS: These 9-track units, released in August 1973, offer all the features of the faster B 9495-5 and B 9495-6 units described above but have tape speeds of 75 ips and 125 ips, respectively. Data is recorded on 1/2-inch tape in IBM-compatible phase-encoded mode at 1600 bpi. Data transfer rate is 120,000 bytes/second for the B 9495-2 and 200,000 bytes/second for the B 9495-3. Both models can optionally be equipped to operate in NRZI mode at 800 bpi, at half the above data transfer rates. Like the B 9495-5/6 tape units, these units can be used in any B 2800/3800/4800 system with up to 4 tape controls, up to 16 tape units, and on appropriate Master Electronic exchange.

B 9496-2 & B 9496-4 MAGNETIC TAPE UNITS: Introduced in August 1973, these low-cost tape drives feature improved reliability and "low-boy" cabinets (44 inches high). Data is recorded on 1/2-inch tape in IBM-compatible phase-encoded mode at 1600 bpi. The B 9496-2 has a tape speed of 25 ips and a data rate of 40,000 bytes/second, while the B 9496-4 has a tape speed of 50 ips and a data rate of 80,000 bytes/second. These units can be used with any B 2800/3800/4800 computer in a subsystem consisting of one or two tape controls, up to eight tape units, and an appropriate Master Electronic Exchange (1 x 4, 1 x 8, or 2 x 8).

B 9111 CARD READER: Reads 80-column cards of either standard or postcard thickness serially by column, on demand, at up to 800 cpm. Can also read 51-, 60-, or 66-column cards. EBCDIC is the standard card code, and BCL or binary cards can also be read. The feed hopper and stacker hold up to 2400 cards each and can be loaded and unloaded while the reader is operating. Optional features permit reading of 40-column Treasury Checks and/or round-holed Postal Money Orders. Can be connected to a B 2800/3800/4800 system through a control unit and an 8-Channel I/O Cabinet.

B 9112 CARD READER: Reads up to 1400 cpm. Otherwise, has the same characteristics and features as the B 9111 Card Reader described above. Can be connected to a B 2800/3800/4800 system through a control unit and an 8-Channel I/O Cabinet.

B 9115 CARD READER: A compact, table-top unit that reads 80-column cards serially by column at a rated speed ➤

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▷ October 1974 for the large-scale B 6700 and B 7700 computers, DMS-II represents Burroughs' original approach to the implementation of a full-scale data base management system. Unique features of the system include its integration into the MCP operating system to achieve high system throughput, and an easy-to-use Data and Structure Definition Language for describing the logical organization of information in the data base. DMS-II was also released for the Burroughs B 1700 series computers in December 1975, and undoubtedly will become one of the key software products to contribute to Burroughs' marketing successes in the future. The new ANS-74 COBOL is slated to include interfaces to DMS-II and a Binder capability to permit users to write and compile small independent programs, such as transaction processing programs, that can be bound together to be executed as a large integrated program at run time.

Communications-oriented software support includes the Network Definition Language, which provides an easy-to-use language for defining telecommunications networks using station names, terminal types, line speeds, and line procedures, and permits networks to be reconfigured by simply adding new parameters and recompiling the communications control program. Enhancements were also announced for the MCP time-sharing facilities. A Remote Compilation System, along with the EDITOR software, provides facilities for preparation of programs in the COBOL, FORTRAN, BASIC, and Burroughs Programming Language (BPL) languages. All programs prepared for the B 2800/3800/4800 systems can also be executed in the time-sharing mode under the new MCP Time-Sharing Module.

All new software developed for the B 2800/3800/4800 systems will also be made available to and supported for users off the B 2700, B 3700, and B 4700. Conversely, the full complement of higher-level languages provided for B 2700/3700/4700 systems, including COBOL, FORTRAN, BASIC, Burroughs Programming Language, and COFIRS (for RPG to COBOL translation) is available for the "B-800 Series" systems. Also available is an extensive collection of conversion aids designed to ease the transition from Honeywell Series 200/2000, NCR Century Series, Univac (ex-RCA) Series 70, and IBM RPG environments to Burroughs equipment.

Burroughs also offers a steadily expanding selection of applications programs for the financial, manufacturing, medical, and education industry sectors, most of which, along with DMS-II and TABS, are now separately priced. The ANS-74 COBOL compiler is priced at \$50 per month, although the MCP and previously released compilers, along with normal technical support and training, are still offered at no additional cost.

COMPATIBILITY

A major design goal of the B 2800, B 3800, and B 4800 systems is to maintain complete software compatibility at the object-code level with Burroughs' installed base of B ▷

▶ of 300 cpm. Cards are read photoelectrically, with a double strobe comparison for each column to help ensure reading accuracy. The single input hopper and output stacker hold up to 1000 cards each. An optional feature permits reading of 51-column cards. Can be connected to a B 2800/3800/4800 system through a B X110-8 Card Reader Data Link Processor-3.

B 9116 CARD READER: Reads up to 600 cpm. Otherwise, has the same characteristics as the B 9115 described above. Can be connected to a B 2800/3800/4800 system through a B X110-8 Card Reader Data Link Processor-3.

B 9117 CARD READER: Reads up to 800 cpm. Otherwise, has the same characteristics as the B 9115 described above. Can be connected to a B 2800/3800/4800 system through a B X110 Card Reader Data Link Processor-3.

B 9212-8 CARD PUNCH: Punches 80-column cards at up to 150 cpm.

B 9213 CARD PUNCH: Punches 80-column cards at up to 300 cpm. EBCDIC is the standard card code, and BCL or binary cards can also be punched. The feed hopper holds up to 2200 cards, and three program-selectable stackers hold at least 1400 cards each. The associated control unit contains a full-card buffer. Both the B 9212 and B 9213 Card Punches can be connected to a B 2800/3800/4800 system through a control unit and an 8-Channel I/O Cabinet.

B 9210 PAPER TAPE READER: Reads 5-, 6-, 7-, or 8-level punched tape at 500 or 1000 characters per second. The lower speed must be used for fanfold or 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. Can be connected to a B 2800/3800/4800 system through a control unit and an 8-Channel I/O Cabinet.

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. Can be connected to a B 2800/3800/4800 system through a control unit and an 8-Channel I/O Cabinet.

B 9243 LINE PRINTER: This printer was originally released for B 2700/3700/4700 systems and can be connected to a B 2800/3800/4800 system through an appropriate control unit and an 8-Channel I/O Cabinet. The B 9243 Printer is a rotating-drum printer and has a printing speed of 1100 lines per minute. It has a tape-controlled carriage capable of handling continuous forms from 5 to 20 inches in width, vertical spacing of 6 to 8 lines per inch, and a standard skipping speed of 25 inches per second. The B 9243 is no longer actively marketed.

B 9246-2 HIGH-SPEED PRINTER: This fast drum-type printer outputs 1800 lines per minute when using only the first 36 characters of its 64-character set. The speed is 1250 lpm when the full character set is used, and normal alphanumeric character mixes should result in a throughput of 1500-plus lpm. An optional 64-character set with OCR A numeric characters and 4 special characters yields a print speed of 1200 lpm when the first 46 characters are used and 925 lpm for the full character set. The B 9246-2 is fully buffered, has 132 print positions, prints 6 or 8 lines to the inch, and has a skipping speed of 36 inches/second. It can be connected to a B 2800/3800/4800 system through a control unit and an 8-Channel I/O Cabinet.

B 9247-12 TRAIN PRINTER: This train printer achieves its rated 400-lpm speed with the standard 48-character set. It can be equipped with other interchangeable train modules ▶

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➤ 2700, B 3700, and 4700 computer systems. As a result, users of these "B 700" medium-scale systems can expect to run their current programs on the new systems without modification or recompilation. Since the new systems incorporate essentially the same central processor architecture and instruction repertoire as the earlier B 2700/3700/4700 systems, however, there is no object-level compatibility between the Burroughs medium-scale computers and the large-scale B 6700 and B 7700 systems. Burroughs' approach toward achieving compatibility throughout its general-purpose computer product line is through a gradual standardization of the software products offered for all three families of Burroughs computer systems. The release of the DMS-II data base management system for the B 1700 systems and the B 2800/3800/4800 systems, and the Workflow Management System, originally available only for B 6700 and B 7700 systems and now offered for the B 2800/3800/4800 computers as well, represent important steps toward the achievement of uniformity in Burroughs' software products. Further efforts can be expected in the standardization of the MCP job control language, remote job entry user interfaces, and compilers.

Conversion aids currently available for Burroughs medium system users upgrading to B 6800 or B 7800 systems include the B 6800/7800 COBOL-68 compiler, which accepts B 2800/3800/4800 COBOL source code as input, and "filter" programs to aid in the conversion of FORTRAN programs from one computer to another.

Compatibility between the Burroughs systems and the IBM System/370 and other competitive computers is achieved mainly through the higher-level languages, for which Burroughs provides COFIRS (COBOL From IBM RPG Specifications) and a variety of program conversion aids.

USER REACTION

In the 1977 survey of general-purpose computer users, Datapro received replies from 71 users of the older Burroughs B 2700, B 3700, and B 4700 systems but only 3 responses from users of their new "800 Series" counterparts, the B 2800, B 3800, and B 4800 systems. Since the B 2700/3700/4700 systems are the forerunners of the current "800 Series" medium systems and use most of the same peripheral equipment and software, Datapro considered the experience of these users to be relevant in the evaluation of the B 2800, B 3800, and B 4800.

The user population consisted of 71 users who collectively had 86 systems consisting of 22 B 2700 systems, 20 B 3700 systems, and 44 B 4700 systems. The 86 systems were being used primarily for business data processing applications, but nearly half of the B 2700 and B 4700 users indicated that their systems were also used for data base management and/or data communications applications. The B 3700 users, while also indicating business data processing as the primary usage, were much less frequently involved in secondary application categories than the users of the other two systems. ➤

➤ containing 16, 64, or 96 printable characters. The 96-character set contains both upper and lower case alphabets. The B 9247-12 handles vertical format control via a standard 12-channel carriage control tape. The standard number of print positions is 132. Originally released for certain B 1700 systems and B 2700/3700/4700 systems, the B 9247-12 can be connected to a B 2800/3800/4800 system through a control unit and an 8-Channel I/O Cabinet or a DLP.

B 9247-13 TRAIN PRINTER: Has the same characteristics as the B 9247-12, but prints at 750 lines per minute.

B 9247-14 TRAIN PRINTER: This high-performance train printer outputs 1100 lines per minute and has 132 print positions. It can be equipped with other interchangeable train modules containing 16, 64, or 96 printable characters. The 96-character set contains both upper and lower case alphabets. A 12-channel format tape is used for vertical format control. The B 9247-14 can be connected to a B 2800/3800/4800 system through an 8-Channel I/O Cabinet or a DLP.

B 9247-15 TRAIN PRINTER: Announced in December 1975 with the B 2800, B 3800, and B 4800 systems, this train printer achieves a printing speed of 1500 lines per minute with a 48-character set and incorporates enhancements to facilitate job set-up and operator communications. It can be equipped with other interchangeable print trains containing 72 or 96 printable characters, and has print speeds of 1100 or 850 lines per minute, respectively, using the 72- or 96-character sets. The standard number of print positions is 132, the skipping speed is 90 inches per second, and forms from 4 to 17.875 inches wide and from 1 to 14 inches in length can be handled. A 12-channel format tape handles vertical and horizontal forms alignment. During the job set-up, the format tape is read into an Electronic Forms Control Buffer which handles format control during program execution. The printer also incorporates a variety of fault detection sensors and operator communications indicators to signal conditions such as paper tear, out-of-paper, forms misalignment, etc. The B 9247-15 also includes a powered forms stacker which can stack a full box of paper. The B 9247-15 can be connected via a Train Printer DLP-5 or an I/O control and 8-Channel I/O Cabinet. Deliveries began during the fourth quarter of 1976.

B 9346-2 CONSOLE PRINTER/KEYBOARD: This micro-program-controlled console printer/keyboard includes a serial impact matrix printer that prints at 60 characters per second using a 64-character ASCII character set. The printer has 150 print position and a 64-character buffer and can handle forms from 3 to 16.75 inches wide. The B 9346-2 can be located up to 1,000 feet from the central processor, and contains an audible alarm and a media present detector to signal the end or breakage of console forms. The unit is connected to a B 2800/3800/4800 system through a B X340-8 Console Printer Data Link Processor-4 or an I/O control and 8-Channel I/O Cabinet.

B 9348-3 OPERATOR DISPLAY AND STANDING-LEVEL CONSOLE: Announced in December 1975, the B 9348-3 includes an alphanumeric keyboard and a 9.5 by 7.5 inch CRT display with a capacity of 1,920 characters in 24 lines of 80 characters each. The display character set consists of 69 characters, including upper and lower case letter plus control characters, which are formed using a 5-by-7 dot matrix technique. The B 9348-3 operates under control of the MCP operating system, which interrogates system tables every 10 seconds and automatically displays information on the active job mix and system status, the jobs in the schedule, and system resource allocation. Single or multiple processor configurations can have up to eight display consoles per processor. The B 9348-3 is connected to a B 2800/3800/4800 system through a B X341-8 Operator Display Data Link Processor-4 or an I/O control and 8-Channel I/O Cabinet. It can also be used as a secondary operator console on B 2700/3700/4700 systems. ➤

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➤ Applications software for the 86 systems was most commonly developed by in-house personnel. Proprietary software from Burroughs was the next most frequently indicated software source. And, in accordance with Burroughs' claims regarding the business orientation of its product line, COBOL was the primary program development language employed. All 71 users indicated that they were COBOL shops, and fewer than one-third listed the user of any other standard language.

The user statistics for each of the three series of systems can be summarized as follows:

	B 2700	B 3700	B 4700
No. of systems	22	20	44
Avg. installed life, months	40	33	37
Avg. memory size, bytes	188K	289K	353K
Avg. mass storage, megabytes	191	300	1890
Magnetic tape units	2-6	2-6	1-24
Remote batch terminals	1-6	0-9	0-20
Interactive terminals	0-100	0-32	0-711

The user responses received in the survey are tabulated below. The responses for the three product lines have been combined, but the weighted average for each line is presented separately.

	Excellent	Good	Fair	Poor	2700	3700	4700
					WA*	WA*	WA*
Ease of operation	55	12	1	1	3.8	3.7	3.8
Reliability of mainframe	35	24	7	5	3.2	3.2	3.4
Reliability of peripherals	0	35	21	14	2.4	2.4	2.2
Responsiveness of maintenance service	9	35	20	8	2.7	2.5	2.7
Effectiveness of maintenance service	4	30	24	13	2.6	2.1	2.4
Technical support	3	21	28	19	2.1	2.2	2.0
Operating system	56	14	0	1	3.9	3.7	3.7
Compilers & assemblers	42	24	4	1	3.5	3.7	3.4
Applications programs	5	22	19	8	2.4	2.5	2.4
Ease of programming	39	29	2	1	3.5	3.5	3.5
Ease of conversion	19	30	11	4	3.2	2.9	2.9
Overall satisfaction	22	32	10	5	3.2	2.8	3.0

*Weighted Average on a scale of 4.0 for Excellent.

The most immediately discernible aspect of this three-way user reaction survey is the similarity of the weighted averages calculated for the three product lines in each of the 12 categories. Only in the "effectiveness of maintenance service" category did the variation between the maximum and minimum weighted average ratings for the three types of systems (B 2700, B 3700, and B 4700) exceed 0.4.

The users indicated that the systems are especially easy to operate and that the MCP operating system and Burroughs' COBOL compilers are of the highest quality. And, probably related to their high rating of the COBOL compilers, they also rated the ease of programming category rather highly. However, the reliability of Burroughs' peripheral devices, as well as the vendor's maintenance service and technical support, were numerically criticized by the users through ratings that fell mainly in the fair-to-good range. Burroughs' application programs also received relatively low ratings.

➤ **B 9134-1 READER-SORTER:** Reads optically and/or magnetically encoded numeric documents at up to 1625 documents per minute. Can handle both types of documents of varying sizes and weights in intermixed fashion. The sorting section is available in modules of 4 pockets each, and is expandable to a maximum of 32 pockets. Can be used either on-line or off-line. Can be connected to a B 2800/3800/4800 system through an 8-Channel I/O Cabinet.

B 9137 MCR Reader/Sorter: Has the same performance characteristics as the B 9134, but has a "double read" capability to assist in interpreting imperfect characters. The B 9137 also can be equipped with an optional non-impact printer/endorser and an optional microfilm module for microfilming documents as they are processed by the reader/sorter.

B 9410 PERIPHERAL SWITCHING UNIT: Permits peripheral devices to be manually switched between two control units, which may be connected to different central processors. Connected to a B 2800/3800/4800 system through an 8-Channel I/O Cabinet. (The B 9410 will generally be used for card readers, printers, and other low-speed I/O devices; electronic Exchange units permit magnetic tape units and disk files to be shared by two or more processors.)

COMMUNICATIONS CONTROLS

B X354-81 UNILINE DATA LINK PROCESSOR-4: Permits connection between a single B 2800/3800/4800 processor and a single directly connected communications line through a Balanced Differential Interface.

B X351-82 UNILINE DATA LINK PROCESSOR-4: Permits connection between a single B 2800/3800/4800 processor and one communications line through a data set employing either the Burroughs standard asynchronous or synchronous line procedures. In the synchronous mode the maximum transmission speed is 2400 bits per second, and in the asynchronous mode the maximum transmission speed is 1800 bits per second.

B 774 AND B 874 COMMUNICATIONS PROCESSORS: The B 774 is a microprogrammed front-end communications processor that performs the specialized functions associated with the transmission and reception of data, including error recovery, code translation, line discipline management, and most network control functions for a host processor. A basic B 774 communications processor consists of a 1.7-megahertz processor with 12K bytes of microprogrammed MOS control memory and 8K bytes of MOS main memory with an access time of 500 nanoseconds for two bytes, expandable to 98K bytes. An adapter cluster contains a byte-line scanner capable of interfacing up to 16 dual-line adapters that can service up to 32 half-duplex or 16 full-duplex communications lines. Dual-line adapters that interface two half-duplex lines or one full-duplex line can accommodate asynchronous line speeds up to 1800 bits per second and synchronous or binary synchronous line speeds up to 9600 bits per second. Direct connect and automatic dial-out adapters are also available. Data is transferred between the communications processor and the host central processor at a rate of 1,000,000 bytes per second.

A maximum of eight B 774 Communications Processors can be attached to a single host computer system to support a total of 256 half-duplex lines. Each B 774 Communications Processor is attached to the host communications processor through a B X303-8 B 774 System and Communications Processor DLP-4.

The B 774 has been largely superseded by the B 874 communicator processor, although Burroughs continues to market some versions.

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▷ The bottom-line category of overall satisfaction drew user ratings about midway between the high ratings awarded the ease of operation, mainframe reliability, operating system, and compilers categories and the lower-rated peripheral reliability, maintenance service, technical support, and applications program categories. It is evident that many Burroughs users feel that despite the very efficient MCP operating system and other positive aspects of the B 2700/3700/4700 systems, the lower levels of maintenance service and technical support and less reliable peripherals cannot be completely disregarded. Some of the problem areas will undoubtedly be alleviated through the improved hardware and software facilities of the new B 2800/3800/4800 systems, while others seem to call for an increased commitment to field support of its products by the vendor. □

▶ The B 874 Communications Processor is a faster, more powerful version of the B 774 that is available in two models, the 874-1 and the 874-4. The basic B 874-1 system consists of a 1.7-megahertz processor with 12K bytes of control memory and 4K bytes of MOS main memory, expandable to 94K bytes. The faster B 874-4 consists of a 4-megahertz processor with 16K bytes of control memory and 4K bytes of MOS main memory, also expandable to 94K bytes. The most significant differences between the B 774 and B 874 are the latter's ability to support data transmission rates of 19,200 bps and firmware support for the Burroughs Data Link Control (BDLC) protocol.

A Network Definition Language (NDL) is available to prepare customized network control programs containing tables, system code, and microprograms for each B 774 and B 874 Communications Processor. The network control program is compiled on the host central processor and loaded from the host system disk to the communications processor through an MCP command.

SOFTWARE

MASTER CONTROL PROGRAM: The principal component of Burroughs software support for the B 2800/3800/4800 systems is the MCP, a modular operating system that schedules and controls all operations of the systems. The MCP requires from 14K to 50K bytes of main memory, up to 400K bytes of disk storage, at least one magnetic tape unit, a card reader, and a console typewriter or display console. A high-speed trace option adds another 7.5K bytes to the main memory requirements.

MCP VI, announced in December 1975 and released in August 1976, is the currently available version of MCP and represents a major revision of the MCP V operating system. It contains additional enhancements to permit more flexible main memory management and interface the new DLP I/O subsystem. The new MCP VI multiprogramming executive has the capability to supervise the execution of up to 99 concurrent jobs. Under MCP VI, user programs can be divided into a resident portion that must be resident in main memory for program execution and a series of overlayable segments that can be brought into main memory only when required for program execution. The compiler builds a segment dictionary reflecting the program organization and computes the memory requirements for containing the resident portions of the program plus the minimum main memory space required for accommodating the largest single overlayable segment of the program. During program execution, the MCP uses the segment dictionary to locate required program segments and loads them from disk storage into the user-program "quick overlay" area. When adequate main memory space is available, program overlay segments are allowed to remain in main memory until the space is required by another program.

The MCP performs the following principal functions: 1) schedules the loading and execution of user programs in a multiprogramming environment; 2) allocates core storage and relocates user programs as necessary to achieve efficient storage utilization; 3) schedules and initiates all I/O operations; 4) services all interrupts and attempts recovery from I/O errors; 5) provides I/O control functions such as blocking, buffering, file opening and closing, data communications control, etc.; 6) loads program segments or overlays upon request; 7) creates and maintains disk program libraries in symbolic and/or machine-language form; 8) establishes communication between the system and its operator via the console typewriter, display console, and control cards; 9) provides dump, trace, and checkpoint/restart facilities; and 10) maintains a system log.

The MCP handles batch-mode jobs entered both locally and from remote terminals, as well as data communications and time-sharing jobs. Programs are loaded and executed in a sequence determined by their assigned priorities and memory requirements. Jobs of equal priority are processed on a first-in/first-out basis, and a time-slicing technique is used to insure access to the central processor for programs of equal priority. Top-priority jobs can cause lower-priority jobs to be rolled out to disk to make the required main memory available. When the end of a job is reached and other jobs are waiting, the remaining programs in main memory are compacted to maximize the contiguous memory area available for loading and initiating one or more new programs.

Other significant MCP features are: 1) support of the File Protect Memory hardware, enabling multiple programs to open and share the same head-per-tack disk files at the same time; 2) a "STOQUE" capability that permits asynchronous transfers of data between programs; 3) a 3-level priority system that permits assignment of separate priorities for scheduling, processing, and memory utilization; 4) a 3-level logging system that provides an SPO Log of all system messages, a Maintenance Log showing the performance of each system component, and a Run Log that facilitates cost distribution and system audits; 5) ability to relocate the MCP modules in main memory; 6) ability to overlap MCP I/O operations (such as opening files) with computing; 7) redesigned I/O routines with higher execution speeds; 8) improved directory management and searching techniques; and 9) improved checkpoint/restart facilities.

MCP VI added comprehensive facilities for accumulating data on the utilization of system resources by each executing user program. The program logs central processor utilization, peripheral use by type, and system overhead factors such as load-dumps, print-backup, and pseudo-reader, for each job executed. The log file can be analyzed by the TABS program to prepare billing reports for computer usage.

COBOL: The most recently released Burroughs COBOL compiler is based on COBOL-74 and includes all the facilities of full American National Standard COBOL, including the Sort, Report Writer, and Segmentation modules. Source-language program debugging facilities, data communications constructs, and a number of other useful extensions are also included. The EBCDIC, BCL, and ASCII character sets are now supported. The compiler accepts a COBOL source program and generates a machine-code object program which is placed in disk storage, ready for execution; it can also be written on magnetic tape if desired. The compiler automatically divides all object programs into logical, relocatable segments, and all coding generated by the compiler is re-entrant. COBOL compilation is a 2-pass process, and overall speeds of 5000 to 6000 card images per minute are commonly achieved. A compile-time option permits the COBOL compiler to accept the source code of COBOL programs prepared for Burroughs B 2700/3700/4700 and IBM System/360 and System/370 computers without requiring a filter program. ▶

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Three older versions of the COBOL compiler, originally developed for use with the B 2700, B 3700, and B 4700 systems and also usable with the B 2800, B 3800, and B 4800 systems, are still available. All three versions offer identical language facilities, but the larger ones provide faster compilation and higher limits on the number of data names, procedure names, and pictures that can be used. The smallest compiler, called simply "COBOL," requires 17K bytes of main memory and 190K bytes of disk storage. The second compiler, called "COBOL L," requires 30K bytes of main memory and 240K bytes of disk storage. The largest and newest compiler, called "COBOL V," requires 45K bytes of main memory and generates more efficient object programs. The B 2700/3700/4700 COBOL language is generally consistent with American National Standard COBOL and includes most of its facilities, although the Report Writer module has not been implemented. Effective (though non-standard) language facilities are included for the control of data communications, MICR sorter-readers, and multi-tape listers.

The COBOL Cross-Reference Utility System accepts COBOL source programs as input and generates convenient flowcharts and/or cross-reference listings that show where each data name, internal program switch, and special register is used.

FORTRAN: The original B 2500/3500 FORTRAN compiler, called "FORTRAN," can be used without change on the B 2700/3700/4700 and B 2800/3800/4800 systems. It requires 27K bytes of main memory (in addition to MCP requirements) and a card or paper tape reader and line printer. Also required is 200K bytes of disk storage for the compiler, plus 340K bytes of working storage for each 1000 source-program cards. The language conforms with American National Standard FORTRAN.

A newer FORTRAN compiler, called "FORT IV," provides extended language facilities which are compatible with IBM FORTRAN IV Level H, includes the full ANS FORTRAN language plus numerous extensions, and is upward-compatible with the FORTRAN compilers for the larger B 6800 and B 7800 systems. The compiler requires 45K bytes of main memory and makes use of the fixed-length floating-point arithmetic instructions, extended addressing capabilities, and 4-digit adders of these processors to achieve significantly higher object program execution speeds.

BASIC: Burroughs offers two different compilers for the BASIC language, a Core-Sharing version and a Batch version. Core-Sharing BASIC provides interactive compilation of programs entered from remote terminals. Batch BASIC compiles source programs entered via a card reader. Both versions implement a language that generally corresponds to the original Dartmouth BASIC system, and both provide immediate execution of successfully compiled programs.

REPORT PROGRAM GENERATOR: For users accustomed to programming in the IBM 360/20 RPG language, Burroughs offers a software tool called COFIRS (COBOL From IBM RPG Specifications). COFIRS accepts 360/20 RPG source statements and generates a COBOL source program reflecting the RPG program logic, which is then compiled and executed. Although COFIRS was developed primarily to facilitate conversions from the 360/20, Burroughs maintains that it can also be used effectively on a continuing basis by RPG-oriented installations.

COFIRS II, an RPG-to-COBOL translator was released for B 2700/3700/4700 systems in July 1974 and is also available for B 2800/3800/4800 systems. COFIRS II converts source programs written in B 1700 RPG language, which is largely compatible with IBM's RPG II, into COBOL source programs.

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 and maintained by Disk FORTE or Disk FORTE/2. To describe the files and generate the necessary vocabulary (a one-time operation), the Reporter System 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 produced are described in a concise, English-like language that is largely self-documenting. Numerous default features make it unnecessary for the user 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.

PROBLEM ORIENTED LANGUAGE GENERATOR: POLGEN provides the facilities for creating problem-oriented languages (POLs) that enable users to access the computer using free-form statements in a vocabulary that is relevant to the application environment. The POLs created by POLGEN are designed primarily for interactive processing applications, but can also be executed in batch mode. POLGEN includes a COBOL-like grammar definition language for defining a language syntax, using terminology commonly used in the application environment, and for establishing a list of user-supplied procedures to accomplish the processing objectives of the language. COBOL procedures can also be included in the user grammar description. The statements are processed by the POLGEN program, and a machine representation of the grammar description is created on a disk file for access by the POL translator. During execution, the POL processor controls all user routines, automatically provides services such as opening files and reading input, and scans incoming user statements and selects the procedures to be performed based on the grammar description. A standard POL translator can process any POL language by accessing the specific grammar file defining the language. POLGEN was announced for the B 2700/3700/4700 systems in August 1973 and is a separately priced program product.

ASSEMBLERS: Assembler Language is the symbolic programming language used to write machine-oriented programs. The Advanced Assembler requires 11K bytes of main memory and at least 90K bytes of disk storage (in addition to MCP and working storage requirements), plus card or paper tape reader and printer. Magnetic tape can be used for input and/or output if desired.

The assembly language programmer normally uses a fixed-format coding sheet whose arrangement corresponds closely with the 3-address format of the machine instructions. If the programmer chooses, he can code in a Free-Form Assembly Language which is translated into the regular Assembler format by the Free-Form Translator and then assembled in the usual manner. The Advanced Assembler provides numerous macro and pseudo operations, including data communications control macros. Facilities such as blocking, label checking, and comprehensive error recovery procedure are provided by the MCP.

A Burroughs Program Language (BPL) Compiler, delivered in April 1972, enables programmers to code in a higher-level language that permits complete control of all machine-level facilities, including instruction modification, indexing, incrementation, and character or bit manipulation. Data

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► declarations are required, and facilities for macro instructions and program segmentation are provided. Burroughs emphasizes that BPL is not a COBOL or FORTRAN replacement language, but a replacement for the Assembler for programs that require extensive modification of instructions.

DISK FORTE/2: Announced in August 1973 as an improved version of Burroughs' original Disk FORTE, Disk FORTE/2 is a file management system that provides the ability to structure and maintain a data base on Burroughs head-per-track disk files, disk pack drives, or disk cartridge drives. Up to 999 managed files with 16,000,000 or more records per file can be defined using a free-form keyword language. Six access methods are supported for data retrieval from the data base: index-random, random, index-sequential, index-sequential-grouped, ordered lists, and unsorted lists. 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. A Resource Optimizing Feature permits elements of a data base to be combined on a single disk file to reduce buffer space requirements.

Disk FORTE/2 permits user library routines written in COBOL to be included at generation time to handle such functions as defining item-level record layouts, data validation, and exit handling. Disk FORTE/2 generates COBOL source code which is compiled along with the user's application program. A filter program is available to convert FORTE control files and programs to the new FORTE/2 specifications. Disk FORTE/2 files are interchangeable between B 1700, B 2700/3700/4700, B 2800/3800/4800, B 6700/7700, and B 6800/7800 systems. Future enhancements include a search feature, a remap feature for restructuring the data base, and an automatic audit/recovery capability.

DMS-II: The Burroughs DMS-II Data Base Management System was released to B 2800/3800/4800 users in March 1977. DMS-II is described in detail in Report 70E-112-01.

MCP TIME-SHARING SYSTEM: The MCP V Time-Sharing System, announced in July 1974, combines Editor, a Command and Edit (CANDE) language for terminal user communications, and the BASIC programming language into a time-sharing facility that operates concurrently with other modes of operation under control of the MCP operating system. The Editor language permits terminal users to enter symbolic programs as permanent disk files, compile and execute the programs, load and update previously created symbolic programs, and perform various other operations. An edited file can be a source language file for the BASIC compiler or a data file. Both the BASIC and Editor modules are re-entrant to allow their use by multiple users. The BASIC compiler includes a powerful file handling capability that permits up to 16 data files to be opened by one program at a time and provides string variable operators and functions for problem solving. A DEBUG facility permits the time-sharing user to perform interactive program debugging and to trace his program during execution.

The MCP VI Time-Sharing System includes a Remote Compilation System, a Time-Sharing Module, and the EDITOR capability for program and data file creation. The Remote Compilation System provides facilities for compiling programs using the COBOL V, FORT IV, FORTRAN, BPL, and BASIC V compilers. Both program and data files can be entered through remote terminals. Program and file editing are performed under control of the MCP VI Time-Sharing Module, and all programs compiled for B 2800/3800/4800 systems can be executed in the time-sharing mode under control of the Time-Sharing Module. The Time-Sharing System operates under control of an extension of MCP VI.

NETWORK DEFINITION LANGUAGE: NDL enables users to generate customized data communications control programs. The NDL generator runs on a B 2800/3800/4800 system and produces communications control programs for the B 774 and B 874 Communications Processors. It can also be used to develop a Message Control System for the host processor that interfaces to these processors and/or to the Single-Line and Multi-Line Communications Controls. Alternatively, a user-developed Message Control System can be written in COBOL or the Burroughs Program Language (BPL). The NDL compiler requires a minimum of 90K bytes of main memory.

UTILITY ROUTINES: A Sort Program Generator accepts parameters entered by the user and generates disk or tape sort programs tailored to meet his specific requirements. It can also utilize the "intrinsic sort" capability of the MCP to perform immediate sorts without generating specialized programs. When disk units are used to hold the work files, either a tag sort or a full-record sort can be performed. For tape sorting, from 3 to 8 tape units can be used. A merge capability permits from 2 to 8 properly sequenced input files to be combined into a single output file.

DMPALL is a general information transfer routine that can print the contents of any card, disk, magnetic tape, or paper tape file or transcribe a file between any two types of hardware devices. The file ID, record length, blocking factor, and/or parity can be altered during the transcription compilations and executions, and for program listings.

The Time Analysis and Billing System (TABS) utilizes the MCP-Created system log to analyze computer usage and disburse the costs of the computer and related services according to a hierarchy of charge numbers. The system consists of a series of daily programs that analyze central processor, peripheral, and main memory utilization, multi-programming performance, and the total number of program executions and use time accumulated by each charge number. A monthly billing report reflects the total dollar value of computer services by charge number and prorates the charges for utility services based on the percentage use of the system. A computer charge summary provides a summary of accumulated month-to-date charges per account number for production runs, compiles, program testing, and use of program utilities.

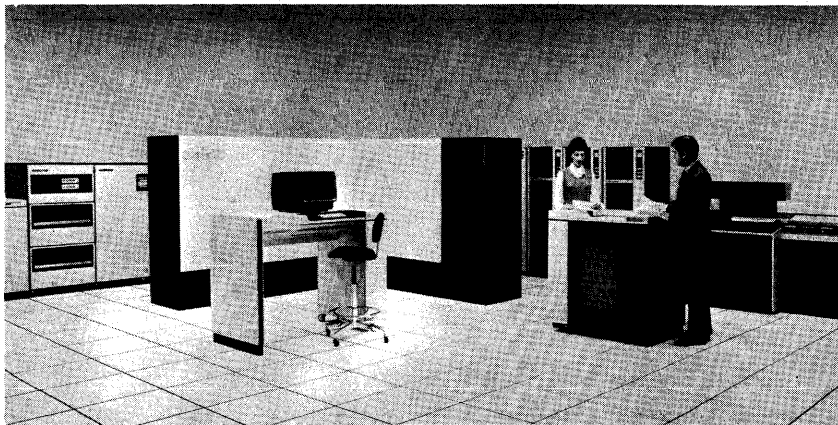
Burroughs offers a number of conversion programs designed to assist users in converting from other Burroughs and competitive computers to the B 2700/3700/4700 systems, and these conversion aids are also available for B 2800/3800/4800 systems. Translation programs are available to facilitate conversions from 1) Burroughs B 500 or B 5500 COBOL to B 2800/3800/4800 COBOL; 2) Burroughs B 300/500 Basic or Advanced Assembler to B 800 Series Assembler; 3) Burroughs B 300/500 Basic and Advanced Assembler to B 2800/3800/4800 COBOL; 4) IBM System/360 RPG and RPG II to B 2800/3800/4800 COBOL; 5) IBM 1400 Series Autocoder or SPS to Burroughs COBOL; 6) UNIVAC (ex-RCA) Series 70 COBOL or BAL to Burroughs COBOL; 7) Honeywell Series 200/2000 COBOL to Burroughs COBOL; 8) Honeywell Series 200 Easycoder to Burroughs COBOL; and 9) NCR Century Series NEAT/3 Level I to Burroughs COBOL.

APPLICATION PROGRAMS: The steadily expanding array of applications software for the B 2700/3700/4700 systems can also be executed on the B 2800/3800/4800 systems and includes the following programs:

Advanced Linear Programming System (ALPS)
Assist (integrated statistical system)
Burroughs Hospital Administrative System-II (BHAS-II)
Burroughs Hospital Information Processing System (BHIPS) ►

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The largest and most powerful of Burroughs' medium-scale systems, the B 4840 features an 8-megahertz processor and 250-nanosecond bipolar memory. It can attach up to 64 input/output channels, consisting of mixtures of Data Link Processor and IOC channels. The system shown has been configured for a banking environment and employs a standing-level table for the system console. The basic B 4840 system includes 200K bytes of memory and 16 I/O channels. Prices begin at \$11,240 on a 1-year lease or \$371,600 on purchase.

- **Burroughs Inventory Control System (BICS)**
- Burroughs Numerical Control System (remote and conversational APT)**
- Commercial Banking (including item processing, demand deposit, personal trust, total information system, commercial loan, installment loan, and time deposit)**
- Federal Reserve Banking (including item processing and automatic item correction)**
- GASP (FORTRAN-based discrete-change simulation language)**
- Generative General Ledger**
- Generative Accounts Payable**
- Mathematical Programming System (including basic optimization module and matrix/generator report writer module)**
- On-Line Wholesale Distribution Package**
- Production Control System-II (including engineering data control, work in process inventory, capacity requirements planning, requirements planning, forecasting and inventory analyses, on-line file maintenance, and on-line inquiry)**
- Project Oriented Management Information System (PROMIS)**
- Scholastic Systems (including scheduling, financial processing, student records test scoring, payroll, and instructional materials)**
- Thrift Industry (including time deposits, mortgage loans, consumer loans, general ledger, and on-line credit union)**

PRICING

EQUIPMENT: The following configurations illustrate the wide range of price and performance that can be achieved with the B 2800, B 3800, and B 4800 systems. All necessary control units and exchange units are included in the indicated prices. The quoted rental prices are for the basic one-year lease and include equipment maintenance.

MEDIUM-SCALE B 2810 SYSTEM: Consists of a 500K-byte B 2810 central processor with 16 Data Link Processor (DLP) channels, one auxiliary cabinet with 8 Input/Output Controller (IOC) channels, a console keyboard/printer and display, four 90-ips, 9-track B 9390 magnetic tape units (72 KBS), a 600-cpm B 9116 card reader, a 1500-lpm B 9247-15 line printer, and a 130.4-megabyte B 9387-1 disk subsystem consisting of two 65.2-megabyte disk pack drives. Monthly rental is \$12,705 and purchase price is \$401,975.

TYPICAL B 3834 SYSTEM: Consists of a 250K-byte B 3834 central processor with 16 DLP channels and 8 IOC channels, a console printer/keyboard and display, four 125-ips, 9-track B 9495-3 magnetic tape units, a 600-cpm B 9116 card reader, a 1500-lpm B 9247-15 line printer, and a mass storage subsystem consisting of a B 9740-1 and a B 9740-2 head-per-track disk file (11.0 megabytes) and two 174.4-megabyte dual-spindle B 9383-6 disk pack drives (348.8 megabytes). Monthly rental is \$19,100 and purchase price is \$641,030.

B 4840 TAPE/DISK SYSTEM: Consists of a B 4840 Central Processor with I/O Subsystem, 16 DLP channels, Floating Point Arithmetic, and 400K bytes of main memory, Console Printer/Keyboard and Display, 600-cpm, B 9116 Card Reader, B 9247-15 Line Printer, four 200KBS B9495-3 Magnetic Tape Units, 23.6 million bytes of B 9470-1 Head-Per-Track Disk Storage, and four 130.4-megabyte B 9484-5 Dual Disk Drives (521.6 MB). Monthly rental is approximately \$27,700 and purchase price is approximately \$1,173,000.

B 4842 DUAL-PROCESSOR SYSTEM: Consists of a B 4842 System with two Central Processors, each including Floating Point Arithmetic, two I/O Subsystems, four DLP Bases, File Protect Memory, and 500K bytes of main memory. Each Central Processor also includes a Console Keyboard/Printer and Display, 600-cpm B 9116 Card Reader, 1500-lpm B 9247-15 Line Printer, and four 200KBS B 9495-3 Magnetic Tape Units. The shared random-access storage includes 23.6 million bytes of B 9470-1 Head-Per-Track Disk Storage and three 348.8-megabyte B 9383-17 Dual Disk Drives (1.05 billion bytes). Monthly rental is approximately \$46,100 and purchase price is approximately \$2,000,000.

SOFTWARE: Program Products for the B 2800/3800/4800 systems 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 three-year or five-year lease term. The available Program Products and their associated license fees are listed under "Software Prices" at the end of this report. The MCP Operating System and utilities and all other software facilities not classified as Program Products are still available to users at no extra cost.

TECHNICAL SUPPORT: The B 2800/3800/4800 hardware prices include "normal and reasonable" technical support to assist in training and advising the customer in the use of his system.

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 24 hours a day, 7 days a week. No 176-hour or measured-time usage lease plans are available.

In addition to the standard 1-year lease, Burroughs offers 3-year and 5-year leases at prices 7 and 11 percent lower, respectively, than the 1-year lease prices shown in the equipment price list.

All lease plans may include Option to Purchase provisions, which allow 50 percent of the rental paid during the first 36 months to be applied toward the purchase price at any time during the lease period. ■

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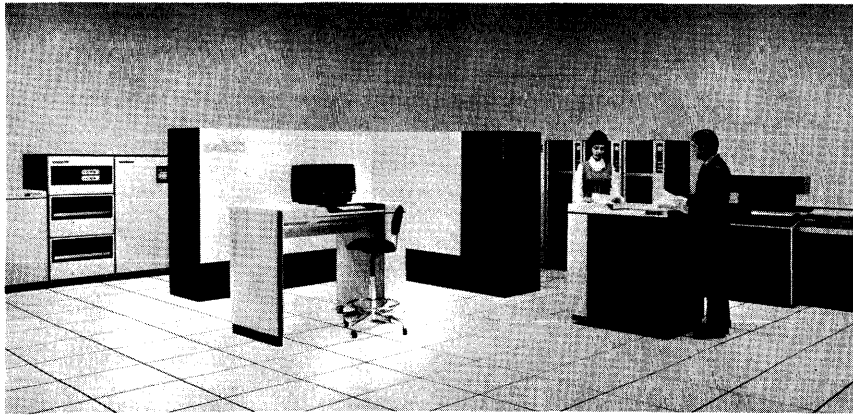
EQUIPMENT PRICES

		Purchase Price	Monthly Maint.*	Rental** (1-year lease)	Rental** (5-year lease)
CENTRAL PROCESSORS					
B 2802	Processor system; includes 2-MHz processor, 100K bytes of 650-nanosecond MOS error-correcting memory, I/O subsystem consisting of 8 IOC channels, and console table; requires console terminal	92 440 42,440	399.00	2,635	2,155
B 2803	Processor system; includes 3-MHz processor, 100K bytes of 650-nanosecond MOS error-correcting memory, I/O subsystem consisting of 8 IOC channels, and console table; requires console terminal	139,220	409.00	3,765	3,085
B 2803-2	Dual-processor system; includes two 3-MHz processors, 200K bytes of 650-nanosecond MOS error-correcting memory, two I/O subsystems each, consisting of 8 DLP channels, file protect memory, two disk file controls, and two console tables; requires two console terminals	344,940	906.00	9,120	7,845
B 2810	Processor system; includes 2-MHz processor, 125K bytes of 650-nanosecond MOS error-correcting memory, and I/O subsystem consisting of 8 DLP channels; requires console terminal	127,400	256.00	3,335	2,730
B 2815	Processor system; includes 3-MHz processor, 125K bytes of 650-nanosecond MOS error-correcting memory, and I/O subsystem consisting of 8 DLP channels; requires console terminal	172,200	275.00	4,565	3,740
B 3834	Processor system; includes 4-MHz processor, 100K bytes of 500-nanosecond MOS error-correcting memory, I/O subsystem consisting of 16 DLP channels, and console table; requires console terminal	219,560	421.00	5,580	4,990
B 3834-2	Dual-processor system; includes two 4-MHz processors, 200K bytes of 500-nanosecond MOS error-correcting memory, I/O subsystem consisting of 32 DLP channels, file protect memory, two console tables, auxiliary power supply, and auxiliary cabinet; requires two console terminals	457,570	1,038.00	11,690	9,440
B 3835	Processor system; includes 4-MHz processor, 500K bytes of 500-nanosecond MOS error-correcting memory, I/O subsystem consisting of 16 DLP channels, and console tables; requires console terminal	305,800	1,121.00	8,870	7,265
B 4840	Processor system; includes 8-MHz processors, 200K bytes of 250-nanosecond bipolar error-correcting memory, and I/O subsystem consisting of 16 DLP channels; requires console terminal	371,600	556.00	11,240	9,105
B 4841	Add-on processor for dual-processor systems; includes 8-MHz processor, 200K bytes of 250-nanosecond bipolar error-correcting memory, I/O subsystem consisting of 16 DLP channels, file protect memory, auxiliary power supply, and auxiliary cabinet; requires console terminal	410,600	752.00	12,420	10,060
B 4842	Dual-processor system; includes two 8-MHz processors, 200K bytes of 250-nanosecond bipolar error-correcting memory, I/O subsystem consisting of 32 DLP channels, file protect memory, auxiliary power supply, and auxiliary cabinet; requires two console terminals	689,400	1,308.00	20,855	16,890
SYSTEM CONSOLES AND CONTROLS					
B 9346-2	Console printer and keyboard, 60 cps; requires B X340-2 control	5,100	29.50	155	135
B 2340-2	Console printer control for B 2800 systems	5,100	18.90	160	130
B X340-2	Console printer control for B 3800 or B 4800 systems	6,200	23.10	190	150
B 9348-31	Free-standing operator display	6,460	34.00	170	140
B X341-1	Console display control for B 9348-31	7,415	19.30	195	155
B 9348-32	Operator display with uncased keyboard; not available for B 2802/3 systems	6,460	34.00	170	140
B X342-8	Standing-level console table for B 9348 displays; not available to B 2802/3 systems	1,950	—	50	45
B X342-81	Desk console table for B 9340 displays	975	—	25	20
B 2800 SYSTEM OPTIONS					
B 2305	Peripheral Control Cabinet for up to eight DLP's; for B 2802 and B 2803	17,280	45.10	500	410
B 2306	Extended Power Module for B 2305 cabinet or for memory greater than 300K bytes	10,000	39.20	300	245
B 2098	Independent Auxiliary Power Cabinet; for B 2376 file protect memory, B 2490 magnetic tape unit exchange, or B 2472 disk file exchange	12,480	14.20	315	255
B 2096	I/O Cabinet; provides space for up to eight IOC channels; requires B 2301 or B 2302 channels	17,280	51.40	500	400
B 2301	Type A Channel for low-speed devices; used with B 2096 cabinet	1,350	7.20	35	30
B 2302	Type B Channel for high-speed devices; used with B 2096 cabinet	2,695	14.20	70	55
B 2097	Auxiliary Cabinet for up to four I/O channels	18,000	44.90	545	440
B 2095	Data Link Processor Cabinet for B 2815 systems	17,000	64.20	515	420
B 2099	Floating Point Option	2,695	10.00	70	55
B 3800 AND B 4800 OPTIONS					
B X095-8	Additional Data Link Processor Cabinet; includes one DLP, for B 3835 only	17,000	64.20	515	420
B X305-8	Data Link Processor Base for B X095-8 cabinet, for B 3835 only	9,000	23.30	270	220
B X096-8	I/O Cabinet; provides space for up to eight IOC channels; requires B 3301 or B 3302 channels	17,280	46.70	500	410
B X301	Type A Channel for low-speed devices; used with B X096 cabinet	1,350	7.20	35	30
B X302	Type B Channel for high-speed devices; used with B X096 cabinet	2,695	14.20	70	55
B X097-8	Auxiliary Cabinet for up to four I/O channels	18,000	40.80	545	465
B X098-8	Independent auxiliary power cabinet for B X376 file protect memory, B X490 magnetic tape unit exchange, or B X472 disk file exchange				
B 2800 MEMORY					
B 2015-5	B 2802 and B 2803 Memory: 50,000 bytes	15,000	37.80	435	355
B 2020-5	100,000 bytes	30,000	75.60	820	710
B 2025-5	150,000 bytes	45,000	113.00	1,305	1,065
B 2030-5	200,000 bytes	60,000	151.00	1,740	1,425

* Monthly maintenance prices for 5-day, 8-hour coverage.

**Rental prices include 7-day, 24-hour maintenance coverage.

Burroughs B 2800, B 3800, & B 4800



The largest and most powerful of Burroughs' medium-scale systems, the B 4840 features an 8-megahertz processor and 250-nanosecond bipolar memory. It can attach up to 64 input/output channels, consisting of mixtures of Data Link Processor and IOC channels. The system shown has been configured for a banking environment and employs a standing-level table for the system console. The basic B 4840 system includes 200K bytes of memory and 16 I/O channels. Prices begin at \$11,240 on a 1-year lease or \$371,600 on purchase.

- **Burroughs Inventory Control System (BICS)**
Burroughs Numerical Control System (remote and conversational APT)
Commercial Banking (including item processing, demand deposit, personal trust, total information system, commercial loan, installment loan, and time deposit)
Federal Reserve Banking (including item processing and automatic item correction)
GASP (FORTRAN-based discrete-change simulation language)
Generative General Ledger
Generative Accounts Payable
Mathematical Programming System (including basic optimization module and matrix/generator report writer module)
On-Line Wholesale Distribution Package
Production Control System-II (including engineering data control, work in process inventory, capacity requirements planning, requirements planning, forecasting and inventory analyses, on-line file maintenance, and on-line inquiry)
Project Oriented Management Information System (PROMIS)
Scholastic Systems (including scheduling, financial processing, student records test scoring, payroll, and instructional materials)
Thrift Industry (including time deposits, mortgage loans, consumer loans, general ledger, and on-line credit union)

PRICING

EQUIPMENT: The following configurations illustrate the wide range of price and performance that can be achieved with the B 2800, B 3800, and B 4800 systems. All necessary control units and exchange units are included in the indicated prices. The quoted rental prices are for the basic one-year lease and include equipment maintenance.

MEDIUM-SCALE B 2810 SYSTEM: Consists of a 500K-byte B 2810 central processor with 16 Data Link Processor (DLP) channels, one auxiliary cabinet with 8 Input/Output Controller (IOC) channels, a console keyboard/printer and display, four 90-ips, 9-track B 9390 magnetic tape units (72 KBS), a 600-cpm B 9116 card reader, a 1500-lpm B 9247-15 line printer, and a 130.4-megabyte B 9387-1 disk subsystem consisting of two 65.2-megabyte disk pack drives. Monthly rental is \$12,705 and purchase price is \$401,975.

TYPICAL B 3834 SYSTEM: Consists of a 250K-byte B 3834 central processor with 16 DLP channels and 8 IOC channels, a console printer/keyboard and display, four 125-ips, 9-track B 9495-3 magnetic tape units, a 600-cpm B 9116 card reader, a 1500-lpm B 9247-15 line printer, and a mass storage subsystem consisting of a B 9740-1 and a B 9740-2 head-per-track disk file (11.0 megabytes) and two 174.4-megabyte dual-spindle B 9383-6 disk pack drives (348.8 megabytes). Monthly rental is \$19,100 and purchase price is \$641,030.

B 4840 TAPE/DISK SYSTEM: Consists of a B 4840 Central Processor with I/O Subsystem, 16 DLP channels, Floating Point Arithmetic, and 400K bytes of main memory, Console Printer/Keyboard and Display, 600-cpm, B 9116 Card Reader, B 9247-15 Line Printer, four 200KBS B9495-3 Magnetic Tape Units, 23.6 million bytes of B 9470-1 Head-Per-Track Disk Storage, and four 130.4-megabyte B 9484-5 Dual Disk Drives (521.6 MB). Monthly rental is approximately \$27,700 and purchase price is approximately \$1,173,000.

B 4842 DUAL-PROCESSOR SYSTEM: Consists of a B 4842 System with two Central Processors, each including Floating Point Arithmetic, two I/O Subsystems, four DLP Bases, File Protect Memory, and 500K bytes of main memory. Each Central Processor also includes a Console Keyboard/Printer and Display, 600-cpm B 9116 Card Reader, 1500-lpm B 9247-15 Line Printer, and four 200KBS B 9495-3 Magnetic Tape Units. The shared random-access storage includes 23.6 million bytes of B 9470-1 Head-Per-Track Disk Storage and three 348.8-megabyte B 9383-17 Dual Disk Drives (1.05 billion bytes). Monthly rental is approximately \$46,100 and purchase price is approximately \$2,000,000.

SOFTWARE: Program Products for the B 2800/3800/4800 systems 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 three-year or five-year lease term. The available Program Products and their associated license fees are listed under "Software Prices" at the end of this report. The MCP Operating System and utilities and all other software facilities not classified as Program Products are still available to users at no extra cost.

TECHNICAL SUPPORT: The B 2800/3800/4800 hardware prices include "normal and reasonable" technical support to assist in training and advising the customer in the use of his system.

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 24 hours a day, 7 days a week. No 176-hour or measured-time usage lease plans are available.

In addition to the standard 1-year lease, Burroughs offers 3-year and 5-year leases at prices 7 and 11 percent lower, respectively, than the 1-year lease prices shown in the equipment price list.

All lease plans may include Option to Purchase provisions, which allow 50 percent of the rental paid during the first 36 months to be applied toward the purchase price at any time during the lease period.■

Burroughs B 2800, B 3800, & B 4800

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.*	Rental** (1-year lease)	Rental** (5-year lease)
CENTRAL PROCESSORS					
B 2802	Processor system; includes 2-MHz processor, 100K bytes of 650-nanosecond MOS error-correcting memory, I/O subsystem consisting of 8 IOC channels, and console table; requires console terminal	42,440 92,245	399.00	2,635	2,155
B 2803	Processor system; includes 3-MHz processor, 100K bytes of 650-nanosecond MOS error-correcting memory, I/O subsystem consisting of 8 IOC channels, and console table; requires console terminal	139,220	409.00	3,765	3,085
B 2803-2	Dual-processor system; includes two 3-MHz processors, 200K bytes of 650-nanosecond MOS error-correcting memory, two I/O subsystems each, consisting of 8 DLP channels, file protect memory, two disk file controls, and two console tables; requires two console terminals	344,940	906.00	9,120	7,845
B 2810	Processor system; includes 2-MHz processor, 125K bytes of 650-nanosecond MOS error-correcting memory, and I/O subsystem consisting of 8 DLP channels; requires console terminal	127,400	256.00	3,335	2,730
B 2815	Processor system; includes 3-MHz processor, 125K bytes of 650-nanosecond MOS error-correcting memory, and I/O subsystem consisting of 8 DLP channels; requires console terminal	172,200	275.00	4,565	3,740
B 3834	Processor system; includes 4-MHz processor, 100K bytes of 500-nanosecond MOS error-correcting memory, I/O subsystem consisting of 16 DLP channels, and console table; requires console terminal	219,560	421.00	5,580	4,990
B 3834-2	Dual-processor system; includes two 4-MHz processors, 200K bytes of 500-nanosecond MOS error-correcting memory, I/O subsystem consisting of 32 DLP channels, file protect memory, two console tables, auxiliary power supply, and auxiliary cabinet; requires two console terminals	457,570	1,038.00	11,690	9,440
B 3835	Processor system; includes 4-MHz processor, 500K bytes of 500-nanosecond MOS error-correcting memory, I/O subsystem consisting of 16 DLP channels, and console tables; requires console terminal	305,800	1,121.00	8,870	7,265
B 4840	Processor system; includes 8-MHz processors, 200K bytes of 250-nanosecond bipolar error-correcting memory, and I/O subsystem consisting of 16 DLP channels; requires console terminal	371,600	556.00	11,240	9,105
B 4841	Add-on processor for dual-processor systems; includes 8-MHz processor, 200K bytes of 250-nanosecond bipolar error-correcting memory, I/O subsystem consisting of 16 DLP channels, file protect memory, auxiliary power supply, and auxiliary cabinet; requires console terminal	410,600	752.00	12,420	10,060
B 4842	Dual-processor system; includes two 8-MHz processors, 200K bytes of 250-nanosecond bipolar error-correcting memory, I/O subsystem consisting of 32 DLP channels, file protect memory, auxiliary power supply, and auxiliary cabinet; requires two console terminals	689,400	1,308.00	20,855	16,890
SYSTEM CONSOLES AND CONTROLS					
B 9346-2	Console printer and keyboard, 60 cps; requires B X340-2 control	5,100	29.50	155	135
B 2340-2	Console printer control for B 2800 systems	5,100	18.90	160	130
B X340-2	Console printer control for B 3800 or B 4800 systems	6,200	23.10	190	150
B 9348-31	Free-standing operator display	6,460	34.00	170	140
B X341-1	Console display control for B 9348-31	7,415	19.30	195	155
B 9348-32	Operator display with uncased keyboard; not available for B 2802/3 systems	6,460	34.00	170	140
B X342-8	Standing-level console table for B 9348 displays; not available to B 2802/3 systems	1,950	—	50	45
B X342-81	Desk console table for B 9340 displays	975	—	25	20
B 2800 SYSTEM OPTIONS					
B 2305	Peripheral Control Cabinet for up to eight DLP's; for B 2802 and B 2803	17,280	45.10	500	410
B 2306	Extended Power Module for B 2305 cabinet or for memory greater than 300K bytes	10,000	39.20	300	245
B 2098	Independent Auxiliary Power Cabinet; for B 2376 file protect memory, B 2490 magnetic tape unit exchange, or B 2472 disk file exchange	12,480	14.20	315	255
B 2096	I/O Cabinet; provides space for up to eight IOC channels; requires B 2301 or B 2302 channels	17,280	51.40	500	400
B 2301	Type A Channel for low-speed devices; used with B 2096 cabinet	1,350	7.20	35	30
B 2302	Type B Channel for high-speed devices; used with B 2096 cabinet	2,695	14.20	70	55
B 2097	Auxiliary Cabinet for up to four I/O channels	18,000	44.90	545	440
B 2095	Data Link Processor Cabinet for B 2815 systems	17,000	64.20	515	420
B 2099	Floating Point Option	2,695	10.00	70	55
B 3800 AND B 4800 OPTIONS					
B X095-8	Additional Data Link Processor Cabinet; includes one DLP, for B 3835 only	17,000	64.20	515	420
B X305-8	Data Link Processor Base for B X095-8 cabinet, for B 3835 only	9,000	23.30	270	220
B X096-8	I/O Cabinet; provides space for up to eight IOC channels; requires B 3301 or B 3302 channels	17,280	46.70	500	410
B X301	Type A Channel for low-speed devices; used with B X096 cabinet	1,350	7.20	35	30
B X302	Type B Channel for high-speed devices; used with B X096 cabinet	2,695	14.20	70	55
B X097-8	Auxiliary Cabinet for up to four I/O channels	18,000	40.80	545	465
B X098-8	Independent auxiliary power cabinet for B X376 file protect memory, B X490 magnetic tape unit exchange, or B X472 disk file exchange				
B 2800 MEMORY					
B 2802 and B 2803 Memory:					
B 2015-5	50,000 bytes	15,000	37.80	435	355
B 2020-5	100,000 bytes	30,000	75.60	820	710
B 2025-5	150,000 bytes	45,000	113.00	1,305	1,065
B 2030-5	200,000 bytes	60,000	151.00	1,740	1,425

* Monthly maintenance prices for 5-day, 8-hour coverage.

**Rental prices include 7-day, 24-hour maintenance coverage.

Burroughs B 2800, B 3800, & B 4800

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.*	Rental** (1-year lease)	Rental** (5-year lease)
B 2800 MEMORY (Continued)					
B 2035-5	250,000 bytes	75,000	189.00	2,175	1,780
B 2040-5	300,000 bytes	90,000	227.00	2,610	2,135
B 2045-5	350,000 bytes	105,000	265.00	3,045	2,495
B 2050-5	400,000 bytes	120,000	302.00	3,480	2,850
B 2810 and B 2815 Memory:					
B 2025-9	125,000 bytes	13,700	19.50	595	490
B 2037-9	250,000 bytes	27,400	39.00	1,190	980
B 2050-9	375,000 bytes	41,000	58.50	1,785	1,470
B 3800 MEMORY					
B 3834 Memory:					
B 3015-8	50,000 bytes	16,560	48.60	555	475
B 3020-8	100,000 bytes	33,120	97.20	1,110	950
B 3025-8	150,000 bytes	49,680	146.00	1,665	1,425
B 3030-8	200,000 bytes	66,240	194.00	2,220	1,900
B 3035-8	250,000 bytes	82,800	243.00	2,775	2,250
B 3040-8	300,000 bytes	99,360	292.00	3,330	2,700
B 3045-8	350,000 bytes	115,920	340.00	3,885	3,150
B 3050-8	400,000 bytes	132,480	389.00	4,440	3,600
B 3835 Memory:					
B 3075-8	250,000 bytes	28,000	58.00	1,015	830
B 3100-8	500,000 bytes	56,000	116.00	2,030	1,660
B 4800 MEMORY					
B 4840, B 4841, and B 4842 Memory:					
B 4030-8	100,000 bytes	40,000	107.00	1,215	980
B 4040-8	200,000 bytes	80,000	213.00	2,420	1,960
B 4050-8	300,000 bytes	120,000	321.00	3,630	2,940
B 4060-8	400,000 bytes	160,000	428.00	4,840	3,920
B 4070-8	500,000 bytes	200,000	535.00	6,050	4,900
B 4080-8	600,000 bytes	240,000	641.00	7,260	5,880
B 4090-8	700,000 bytes	280,000	748.00	8,470	6,860
B 4100-8	800,000 bytes	320,000	856.00	9,680	7,840

DLP'S, EXCHANGES, AND FEATURES

B X110-8	Card Reader DLP-3 (for B 9115/6/7 only)	2,400	14.20	70	55
B X247-81	Line Printer DLP-5 (for B 9247-12/-13/-14 only)	6,000	23.10	180	150
B X247-82	Line Printer DLP-5 (for B 9247-15 only)	14,400	23.10	485	390
B X395-81	40/80 Mag Tape DLP-3 (for B 9246, 2/-4 only)	12,200	44.90	375	300
B X395-82	120/200/320/400KB Mag Tape DLP-3 (for B 9245-2/-3/-5/-6 only)	15,900	77.00	555	470
B X304-8	Disk Pack Drive DLP-4	4,000	20.60	190	150
B X373-81	HPT Disk File 1 x 2 DLP-4 (for B 9470 Series only)	10,000	21.90	275	235
B X373-82	HPT Disk File 1 x 2 DLP-5 w/FPM Adapter (for B 9470 Series only)	12,400	28.30	335	285

B 9470 HEAD-PER-TRACK DISK SUBSYSTEMS

B 9470-1	Primary Storage Module for B 4800/B 3800/B 2800 systems; 5.5M bytes, 5 ms access	34,000	71.40	1,030	840
B 9470-2	Add-On Storage Module for B 4800/B 3800/B 2800 systems; 5.5M bytes, 5 ms access (requires one B 9470-1)	34,000	71.40	1,030	840
B 9470-11	Primary Storage Module for B 4800/B 3800/B 2800 systems; 5.9M bytes, 5 ms access	28,000	69.20	850	695
B 9470-12	Add-on Storage Module for B 4800/B 3800/B 2800 systems; 5.9M bytes, 5 ms access (requires one B 9470-2)	28,000	69.20	850	695
B 9471-6	Disk Electronics Unit for B 9470-1 or B 9470-2 Storage Module (one required for every four modules)	10,000	43.10	305	250
B X377-6	Basic N1 x N2 Exchange (up to 4 x 4)	8,400	32.10	255	205
B X377-8	N1 x N2 Expander for X X377-6 (up to 8 x 8)	1,000	3.90	30	25
B X377-12	N2 Expansion for B X377-8 (3 maximum—up to 8 x 12, 8 x 16, 8 x 20)	1,000	3.90	30	25
B X377-31	Control or DLP Adapter for B X377-6/-8 (N1 side—up to 8)	1,200	5.10	35	30
B X377-32	DE Adapter for B X377-6/-8 (N2 side—up to 20)	1,200	5.10	35	30
B X377-2	N2 Expander for B X377-1 (3 maximum—up to 1 x 2, 1 x 3, 1 x 4)	2,000	7.00	60	50

DISK PACK DRIVES

B 9383-6	Disk Storage/Single Controller (174.4 MB)	57,800	368.00	1,785	1,375
B 9383-7	Disk Storage/Dual Controller (174.4 MB)	74,800	426.00	2,310	1,800
B 9383-8	Disk Storage/Dual Controller (872.0 MB)	224,630	1,373.00	6,945	5,421
B 9486-3	Dual Drive Increment (95.5 MB) for B 9383-6, B 9383-7, or B 9383-8)	33,600	135.00	885	725
B 9486-4	Dual-Drive Increment (174.4 MB) for B 9383-6, B 9383-7, or B 9383-8)	36,800	222.00	1,205	950
B 9974-4	Certified Disk Pack	690	—	—	—
B 9383-16	Disk Storage/Single Controller; 348.8 MB, 30 ms avg. access	70,000	240.00	2,165	1,660
B 9383-17	Disk Storage/Dual Controller; 348.8 MB, 30 ms avg. access	80,000	315.00	2,465	1,900
B 9383-18	Disk Storage/Dual Controller; 174.4 MB, 30 ms avg. access	192,000	975.00	5,930	4,560
B 9484-8	Dual Drive Increment; 384.8 MB, 30 ms avg. access	28,000	165.00	865	665
B 9984	Dual Port Feature (one required per dual drive)	NC	—	—	—
B 9387-1	Disk Storage/Single Controller; 130.4M bytes, 25 ms average access; maximum 1 x 4 spindle exchange	40,040	115.00	1,355	1,030
B 9387-11	Disk Storage/Single Controller; 62.5 M bytes, 25 ms average access	34,000	115.00	1,029	757
B9387-12	Disk Storage/Single Controller; 130.4 M bytes, 25 ms average access	46,000	115.00	1,392	1,025

* Monthly maintenance prices for 5-day, 8-hour coverage.

**Rental prices include 7-day, 24-hour maintenance coverage.

Burroughs B 2800, B 3800, & B 4800

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.*	Rental** (1-year lease)	Rental** (5-year lease)
DISK PACK DRIVES (Continued)					
B 9387-2	Disk Pack Drive Controller for use with B 9484-5 Disk-Pack Drive	36,200	75.00	1,150	897
B X387-5	Basic Disk Pack Drive Exchange for use with B 9387-2 Controllers and B 9484-5 Drive	8,000	42.00	250	195
B X387-6	Controller Port Expansion Adaptor; allows B X387-5 to be addressed by two additional B 9387-2 Controllers	1,600	8.20	50	40
B X387-7	Exchange Expansion Adaptor; allows B X387-5 to be expanded for use with up to 16 drives	4,800	22.00	120	
B 9484-5	130.4M byte Dual Disk Pack Drive; 25 ms average access	30,000	85.00	1,050	770
B X376	File Protect Memory (16 40-bit words)	31,200	164.00	820	660
B X376-1	FPM Disk File Control Adapter (1 required per control; max. of 4)	2,880	13.80	75	60
B X376-2	FPM Memory Module (16 40-bit words)	3,600	18.20	95	75
MAGNETIC TAPE UNITS					
B 9495-2	120KBS, 9 tracks, 1600 bpi	16,000	88.10	510	390
B 9495-3	200KBS, 9 tracks, 1600 bpi	19,065	100.00	645	495
B 9495-5	320KBS, 9 tracks, 1600 bpi	21,850	123.00	740	570
B 9495-6	400KBS, 9 tracks, 1600 bpi	24,180	203.00	820	630
B 9496-2	40KBS, 9 tracks, 1600 bpi	1,440	85.10	320	235
B 9496-4	80KBS, 9 tracks, 1600 bpi	12,160	90.40	410	310
B X394-4	40/80KBS Control (for B 9496-2/9496-4)	13,500	75.10	410	330
B X394-14	PE/NRZ Control (for B 9496-2/9496-4)	14,550	93.60	485	390
B X395-2	120/200KBS Control (for B 9495-2/9495-3)	16,850	77.90	625	500
B X395-7	320/400KBS Control (for B 9495-5/9495-6)	16,850	77.90	625	500
B X395-12	PE/NRZ Control (for B 9495-2/9495-3)	21,750	93.60	740	595
B X395-81	DLP for 9496-2/9496-4; 40/80 KBS	12,200	44.90	375	300
B X395-82	DLP for 9495 series, 120 to 400 KBS	15,900	77.00	585	470
Magnetic Tape Exchanges and Adapters:					
B 9499-10	1 x 4 Master Electronics Exchange for B 9495 Series	14,570	26.90	495	380
B 9499-11	1 x 8 Master Electronics Exchange for B 9495 Series	15,500	26.90	525	405
B 9499-12	2 x 8 Master Electronics Exchange for B 9495 Series	18,290	56.50	620	475
B 9499-13	2 x 16 Master Electronics Exchange for B 9495 Series	20,925	56.50	710	545
B 9499-14	4 x 16 Master Electronics Exchange for B 9495 Series	27,435	84.90	930	715
B 9499-19	3 x 16 Master Electronics Exchange for B 9495 Series	23,715	81.60	805	615
B 9499-30	1 x 4 Master Electronics Exchange for B 9496 Series	10,400	25.80	340	260
B 9499-31	1 x 8 Master Electronics Exchange for B 9496 Series	11,200	25.80	365	285
B 9499-32	2 x 8 Master Electronic Exchange for B 9496 Series	13,120	56.60	430	330
B 9999-1/2	NRZ Option for B 9495 Magnetic Tape Drives	750	4.20	25	20
OTHER INPUT/OUTPUT UNITS					
B 9111	Card Reader; 800 cpm, 80 column	18,165	118.00	465	380
B 9112	Card Reader; 1400 cpm, 80 column	24,145	178.00	645	525
B 2110-2	Card Reader Control (B 2800)	3,495	11.30	90	70
B 3110-2/4110	Card Reader Control (B 3800/4800)	3,495	12.20	90	70
B 9117	Card Counter (for B 9111, 9112 or 9113)	10,560	67.30	345	265
B 9119-1	Card Reader; 300 cpm, 96-column	4,420	32.80	135	110
B 9119-2	Card Reader; 1000 cpm, 96-column	9,940	65.50	280	230
B 9115	Card Reader; 300 cpm	7,360	39.20	240	180
B 9116	Card Reader; 600 cpm	9,280	54.90	305	230
B 9117	Card Reader; 800 cpm	10,560	67.30	345	265
B X110-5	Card Reader Control (for B 9115/9116/9117)	3,275	11.30	80	65
B 9212	Card Punch; 150 cpm	20,640	125.00	434	—
B 9213	Card Punch; 300 cpm	25,440	160.00	535	—
B 2212-2	Card Punch Control (B 2800)	2,592	8.80	54	—
B 3212-2/4212	Card Punch Control (B 3800/4800)	3,360	9.20	70	—
B 9419-2	Card Reader Punch/Data Recorder; 300/60 cpm, 96-column	8,750	93.10	330	270
B X319	Card Reader Punch/Data Recorder Control for B 9419-2	4,495	15.70	115	90
B 9120	Paper Tape Reader; 500-1000 cps	16,560	90.00	314	—
B 2120-2	Paper Tape Reader Control (B 2800)	2,695	10.00	56	—
B 3120-2/4120	Paper Tape Reader Control (B 3800/4800)	3,495	10.00	73	—
B 9926	Input Code Translator	7,200	13.00	152	—
B 9220	Paper Tape Punch; 100 cps	15,840	84.00	272	—
B 2220-2	Paper Tape Punch Control (B 2800)	2,695	10.00	56	—
B 3220/4220	Paper Tape Punch Control (B 3800/4800)	2,495	10.00	59	—
B 9928	Output Code Translator	7,090	13.00	137	—
B 9243-1	Printer; 1100 lpm, 120 positions	24,350	320.00	860	660
B 9246-2	Printer; 1800 lpm, 132 positions	67,275	413.00	1,960	1,540
B 2240-1	Printer Control (for B 2800, with B 9943)	9,400	11.30	225	190
B 2242-1	Printer Control (for B 2800, without B 9943)	9,400	16.90	225	190
B 3240-1/4240	Printer Control (for B 3800/4800, with B 9943)	9,400	15.30	225	190
B 3242-1/4242	Printer Control (for B 3800/4800, without B 9943)	9,400	15.30	225	190
B 2243-1	Printer Control (for B 9247-12 and 9247-13)	9,985	29.80	250	205
B 9247-12	Train Printer; 400 lpm, 132 positions	18,600	173.00	780	615
B 9247-13	Train Printer; 750 lpm, 132 positions	28,000	235.00	990	760
B 9247-14	Train Printer; 1100 lpm, 132 positions	38,000	289.00	1,145	880
B 9247-15	Printer; 1500 lpm, 132 positions	58,400	470.00	1,915	1,475
B 9942-9	Additional Train Module (for B 9247-12/13)	3,500	25.20	82	67

* Monthly maintenance prices for 5-day, 8-hour coverage.

**Rental prices include 7-day, 24-hour maintenance coverage.

Burroughs B 2800, B 3800, & B 4800

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.*	Rental** (1-year lease)	Rental** (5-year lease)
OTHER INPUT/OUTPUT UNITS (Continued)					
B 9942-10	Additional Train Module (for B 9247-14)	3,150	25.40	120	98
B 2247-4	Train Printer Control (for B 9247-14)	9,985	29.80	250	205
B 2247-5	Train Printer Control (for B 9247-15)	9,985	28.40	250	205
B 9134-1	MICR/OCR Reader-Sorter; 1625 dpm, 4 pockets	44,400	460.00	1,222	990
B 9137-1	MICR/OCR Reader-Sorter; 1625 dpm, 4 pockets, double read feature	39,000	540.00	1,300	1,140
B 2130-1	Reader-Sorter Control for MICR only (for B 2800)	6,490	16.90	165	130
B 2130-2	Reader-Sorter Control for MICR/OCR (for B 2800)	9,735	21.20	245	200
B 3130-1/4130-1	Reader-Sorter Control for MICR only (for B 3800/4800)	6,490	22.90	165	130
B 3130-2/4130-2	Reader-Sorter Control for MICR/OCR (for B 3800/4800)	9,735	22.90	245	200
B 9410	Peripheral Switching Unit (basic switch)	7,490	22.90	191	156
B 9410-1	Switch Relay Module	1,500	4.60	39	22
COMMUNICATIONS EQUIPMENT					
B 874-1	Communications Processor; includes 1.7-megahertz processor, 12K bytes of control storage, integrated host interface, and 32-line adapter cluster	23,300	113.00	720	590
B 874-4	Communications Processor; includes 40-megahertz processor, 16K bytes of control storage, integrated host interface, and 32-line adapter cluster	34,075	160.00	895	735
B 1-4	4K bytes of control storage for B 874 processor; maximum 94K bytes	725	4.75	20	15
B 74-1	Memory expansion module for B 874 systems over 32K bytes	5,130	45.00	160	130
B 74-5	Dual host switch for B 874-4 processor	2,585	15.00	75	60
B 74-7	BDLC feature for B 874-4 processor	1,710	8.00	50	40
B 774-1	System and Communications Processor; includes microprogrammed processor (1.7MHz), 12,288 bytes control storage, integrated host interface, 32-line adapter	29,900	105.00	678	—
B 0001-8	8,192 Bytes IC Memory (for B 774-1)	4,400	10.00	101	—
B 0001-12	12,288 Bytes IC Memory	6,160	14.00	142	—
B 0001-16	16,384 Bytes IC Memory	7,920	19.00	182	—
B 0001-20	20,480 Bytes IC Memory	9,680	24.00	223	—
B 0001-24	24,567 Bytes IC Memory	11,440	29.00	263	—
B 0001-28	28,672 Bytes IC Memory	13,200	33.00	304	—
B 0001-32	32,768 Bytes IC Memory	14,960	38.00	344	—
B 0001-40	40,960 Bytes IC Memory	23,100	72.00	533	—
B 0001-48	49,152 Bytes IC Memory	26,620	81.00	611	—
B 0001-64	65,536 Bytes IC Memory	34,100	100.00	783	—
B 0001-80	81,920 Bytes IC Memory	41,800	119.00	960	—
B 0001-96	98,304 Bytes IC Memory	49,500	138.00	1,136	—
B 551-1	Direct connect dual line adapter, two-wire; max. data rate 9600 bps	1,140	4.00	35	30
B 551-2	Direct connect dual line adapter, TTY compatible; max. data rate 38,500 bps	1,140	15.00	35	30
B 551-3	Direct connect dual line adapter, balanced differential interface; max. data rate 19,200 bps	1,520	5.00	45	40
B 551-6	Synchronous/Asynchronous Data Set dual line adapter; max. data rate 9600 bps	1,140	5.00	35	30
B 551-7	BDLC single line adapter for B 874-4; max. data rate 9600 bps	1,330	7.00	40	35
B 551-12	Synchronous/Asynchronous single line adapter with addressing	950	5.00	30	25
B 2802 and B 2803 Communications Equipment:					
B 2303	B 874 control	4,575	14.20	125	100
B 2351	Single line control	5,200	8.50	160	125
B 2352-1	Binary Synchronous control and adapter for computer-to-computer communications, modem connection; maximum data rate 9600 bps	12,400	35.40	375	305
B 2352-2	Broadband control and adapter for computer-to-computer communications, modem connection; maximum data rate 50,000 bps	14,000	49.50	425	345
B 2353-1	Basic multi-line control	12,400	43.90	375	305
B 2354-1	8-channel extension for B 2352-1 control	12,800	14.20	390	315
B 2363-1	Audio dual line adapter for B 2354-1 extension	4,990	21.20	135	110
B 2810, B 2815, B 3834, B 3835, B 4840, B 4841, and B 4842 Communications Equipment:					
B X303	B 874 Control	4,575	14.20	125	100
B X303-8	Data Link Processor for B 874	6,000	20.60	180	150
B X351-81	Data Link Processor for single line; synchronous data rate 2400 bps max., asynchronous data rate 1800 bps max.; data set connection only	7,000	11.60	210	170
B X351-82	Data Link Processor for single balanced differential lines; data rate 9600 bps max.	7,000	11.60	210	170
B X351-1	Single line control	5,200	3.50	160	125
B X352-1	Binary Synchronous control and adapter for computer-to-computer communications, modem connection; maximum data rate 9600 bps	12,400	35.40	375	305
B X352-2	Broadband control and adapter for computer-to-computer communications, modem connection; maximum data rate 50,000 bps	14,000	49.50	425	345
B X653-5	Line Adapter	2,495	7.20	65	50
B X653-6	Line Adapter with addressing	3,420	14.20	90	70
B X667-1	Direct Connect line adapter, Burroughs standard; data rate 1200 bps max., data rates up to 9600 bps obtainable through B X667 speed adapters	2,495	7.20	65	50
B X667-3	Balanced Differential Interface (BDI) line adapter, Burroughs standard; data rate 9600 bps max., similar characteristics to B X6670-1	3,600	11.60	90	75
B X667-5	Asynchronous Modem line adapter; similar to B X667-1	2,495	7.20	65	50
B X667-10	Synchronous Modem Line Adapter; similar to B X667-1	3,175	7.20	80	65

* Monthly maintenance prices for 5-day, 8-hour coverage.

**Rental prices include 7-day, 24-hour maintenance coverage.

Burroughs B 2800, B 3800, & B 4800

EQUIPMENT PRICES

COMMUNICATIONS EQUIPMENT (Continued)

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>Rental** (1-year lease)</u>	<u>Rental** (5-year lease)</u>
B X667-15	Automatic Dial-Out for B X667-5 and B X667-10 line adapters	750	5.20	20	15
B X667-16	Speed Adapter for B X667-1 and B X667-5 line adapters; 1800 bps max.	750	7.20	20	15
B X667-17	Speed Adapter for B X667-1 line adapter; 2400 bps max.	1,500	7.20	35	30
B X667-18	Speed Adapter for B X667-1 and B X667-10 line adapters; 4800 bps max.	1,995	7.20	50	40
B X667-19	Speed Adapter for B X667-1 line adapter; 9600 bps max.	2,495	7.20	60	50
B X355-1	Voice Response Generator	38,690	45.20	1,000	810
B 9955-1	Audio Recording Library; words must be specified	2,575	—	—	—

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SOFTWARE PRICES

UNLIMITED TIME PLAN

LIMITED-TIME PLANS

	<u>Single Payment</u>	<u>12 Monthly Payments</u>	<u>Annual Maint. Charge</u>	<u>Monthly Fee (3-Year Plan)</u>	<u>Monthly Fee (5-Year Plan)</u>
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FINANCIAL MANAGEMENT SYSTEMS

PTS	Personal Trust	30,000	2,750	900	900	864
CUS	Credit Union	20,000	1,835	600	600	576
TDS	Time Deposit	7,500	690	100	100	96
IPS	Commercial Bank Item Processing System	9,720	891	216	216	207
LCB	Large Commercial Bank Item Processing System I	14,040	1,296	324	324	311
LCS	Large Commercial Bank Item Processing System II	19,980	1,836	486	486	466
FRB	Federal Reserve Bank Item Processing System I	14,040	1,296	324	324	311
FRS	Federal Reserve Bank Item Processing System II	19,980	1,836	486	486	466
AIC	IPS Automatic Item Correction	1,080	102	27	27	25
TIM	Total Information File Manager	9,000	825	250	250	240
TII	Total Information File Inquiry	7,000	650	200	200	192
OFS	On-Line Financial Structure	9,000	825	250	250	240
OTP	Transaction Processor	3,500	320	100	100	96
OGL	On-Line General Ledger	4,000	370	100	100	96
CBS	Commercial Banking System	44,900	4,120	1,080	1,080	1,040

INDUSTRIAL MANAGEMENT SYSTEMS

PRT	PROMIS Time	5,000	460	150	150	144
OES	Order Entry (no ongoing maintenance)	15,000	1,375	NA	NA	NA
NCS	APT III	6,300	580	150	150	144
BIA	Burroughs Inventory Control System Analysis	12,600	1,160	300	300	290
BIC	Burroughs Inventory Control System Control	8,400	770	200	200	192
PCE	Engineering Data Control	4,500	415	100	100	96
PCR	Requirements Planning	4,500	415	100	100	96
PCI	Production Control System Inventory	4,500	415	100	100	96
PCW	Work in Process	6,000	550	140	140	135
HSA	Hospital Patient Accounting	0	0	0	0	0
HSB	Hospital Medicare Billing	0	0	0	0	0
HSG	Hospital General Ledger	0	0	0	0	0
HSR	Hospital Medical Records	2,200	200	50	50	48

SCHOLASTIC

SSR	Student Records System	2,700	250	75	75	72
SSI	School Scheduling System	5,000	460	150	150	144
TSS	Test Screen System	3,400	310	95	95	91
SFS	School Financial System	3,600	330	100	100	96

SCIENTIFIC PROGRAM PRODUCTS

AST	Assist	7,350	675	175	175	168
ALP	ALPS (provided on an "as is" basis)	0	0	0	0	0
GAS	GASP	3,150	290	75	75	72

Burroughs B 2800, B 3800, & B 4800

SOFTWARE PRICES

PROGRAM	PRODUCT DEVELOPMENT AIDS	UNLIMITED TIME PLAN			LIMITED-TIME PLANS	
		Single Payment	12 Monthly Payments	Annual Maint. Charge	Monthly Fee (3-Year Plan)	Monthly Fee (5-Year Plan)
REP	Reporter	3,000	275	75	75	72
NDL	Network Definition Language Compiler	2,000	180	150	50	48
FOT	Disk FORTE II	11,000	1,808	275	275	264
POL	Problem Oriented Language Generator	5,000	460	125	125	120
BOI	UNIVAC Series 70 BAL to Burroughs COBOL Translator	12,600	1,155	350	350	—
FIO	UNIVAC Series 70 COBOL to Burroughs COBOL Translator	5,400	495	150	150	—
HNI	Honeywell COBOL to Burroughs COBOL Translator	3,600	330	100	100	—
9484-6	Head-per-track compatible controller system software (for B 9384-6)	12,900	1,183	129	300	—
9484-7	Head-per-track compatible controller system software (for B 9384-7 and B 9384-8)	25,800	2,365	258	600	—
DMS-II	Data Base Management System	11,700	1,073	1,170	390	374