

Burroughs B 2700, B 3700, & B 4700

MANAGEMENT SUMMARY

The B 2700/3700/4700 systems retain and extend the successful hardware and software concepts of the earlier B 2500/3500 systems, which Burroughs introduced in 1966, while delivering significant price/performance improvements. The B 2500/3500 systems strongly emphasize dynamic multiprogramming and user-oriented software, and have long ranked among the outstanding business data processing systems in their price class. The B 2700/3700/4700 systems preserve all of the B 2500/3500 features and add improved computing capabilities, provisions for multiple-processor configurations, a programmable Data Communications Processor, and several new, high performance peripheral devices.

Burroughs now offers medium-scale computer users a choice of six models of the B 2700 system, two models of the B 3700, and ten models of the B 4700. Together, these 18 models span a broad range of performance and price, with central processors of five different speeds, main memory capacities ranging from 30,000 to 2,000,000 bytes, and system rental prices ranging from about \$5,000 to \$75,000 per month. In addition, the earlier B 2510 and B 2520 systems (Report 70C-112-01), which are lower in both price and performance than any of the B 2700 systems, are still being actively marketed as economical "entry" systems to the Burroughs medium-scale computer line.

The principal characteristics of all 18 models of the B 2700/3700/4700 systems are summarized in the comparison chart on the next two pages.

For systems with two or more processors, Burroughs provides software that supports "parallel multiprogram- ➤

The 18 medium-scale computer systems in the B 2700/3700/4700 family add increased performance, improved peripherals, and multiple-processor capabilities to the user-oriented software and effective multiprogramming that characterize the earlier B 2500/3500 computers. System rentals range from about \$5,000 to \$75,000 per month.

CHARACTERISTICS

MANUFACTURER: Burroughs Corporation, 6071 Second Avenue, Detroit, Michigan 48232. Telephone (313) 972-7083.

MODELS: B 2700, B 3700, and B 4700 Data Processing Systems; see table on following pages for characteristics of the 18 specific models.

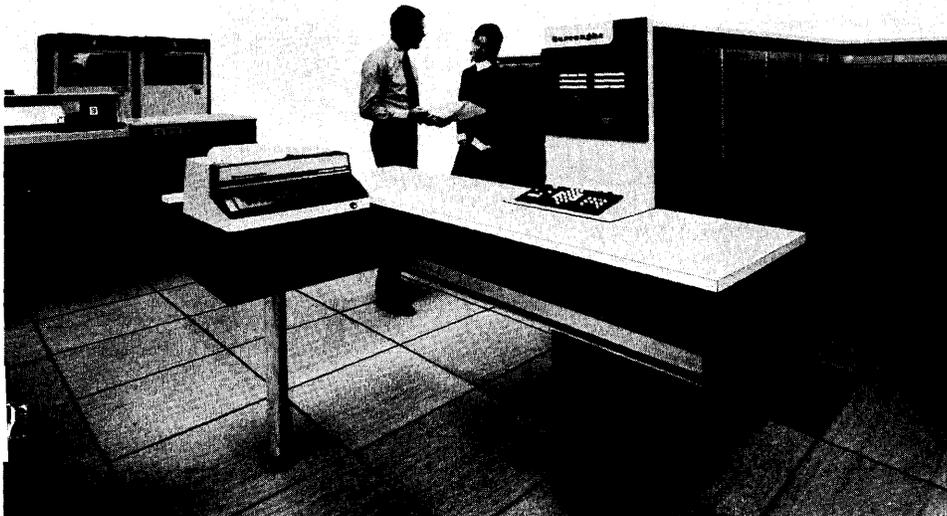
DATA FORMATS

BASIC UNIT: 16-bit word (plus parity bit). Each word can hold two 8-bit bytes or four 4-bit BCD digits. Core 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.

FLOATING-POINT OPERANDS: Consist of a 2-digit exponent and a fraction ranging from 1 to 100 decimal digits in length; the signs of the exponent and fraction each occupy an additional digit position.

The optional Fixed-Length Floating-Point Arithmetic capability for the B3700 and B 4700 central processors provides high-speed arithmetic operations on either "short" or ➤



The B 3700, in the middle of Burroughs' extensive new line of medium-scale computers, features MOS/LSI main memory with a cycle time of 650 nanoseconds per 2-byte access.

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CHARACTERISTICS OF THE B 2700 & B 3700 SYSTEMS

	B 2731	B 2741	B 2751	B 2761	B 2771	B 2772	B 3771	B 3772
CENTRAL PROCESSORS								
No. of processors per system	1	1	1	1	1	2	1	2
Processor cycle time, nanoseconds	1500	1000	500	1000	500	500	333	333
Add time(5 digits), microseconds	113	75	37.5	75	37.5	37.5	23*	23*
Multiply time(5 digits),microseconds	624	416	208	416	208	208	122*	122*
MAIN STORAGE								
Type of storage	Core	Core	Core	Core	Core	Core	MOS	MOS
Minimum capacity, bytes	30,000	30,000	30,000	60,000	60,000	120,000	100,000	200,000
Maximum capacity, bytes	60,000	60,000	60,000	150,000	300,000	600,000	300,000	600,000
Increment size, bytes	10,000	10,000	10,000	30,000	30,000	30,000	50,000	50,000
Cycle time, microseconds	3.0	2.0	1.0	2.0	1.0	1.0	0.65	0.65
Bytes fetched per cycle	2	2	2	2	2	2	2	2
I/O CONTROL								
No. of I/O channels—standard	6	6	6	6	6	12	8	18
No. of I/O channels—maximum	6	6	6	10	20	40	20	40
Type B channels—standard	3	3	3	3	3	6	4	10
Type B channels—maximum	3	3	3	5	10	20	10	20
Maximum total I/O data rate, bytes/second	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	4,000,000	3,000,000	6,000,000
File Protect Memory facility	Optional	Optional	Optional	Optional	Optional	Standard	Optional	Standard
Disk File Exchanges (standard)	0	0	0	0	0	1	0	1
Disk File Controls (standard)	0	0	0	0	0	2	0	2
AVAILABLE PERIPHERALS								
20-msec Disk File storage	Yes							
23-msec Disk File storage	No	No	No	Yes	Yes	Yes	Yes	Yes
40-msec Data Memory Banks	No	No	No	Yes	Yes	Yes	Yes	Yes
Disk pack drives	No	No	No	Yes	Yes	Yes	Yes	Yes
Data Communications Processor	Yes							

*Estimated

▷ ming,” with all processors working from the same operating system in disk storage. Each central processor, however, has its own dedicated core storage unit and its own job stream, and each services its own I/O operations. It is not possible for the processors to share a common main storage unit, nor for jobs to be dynamically interchanged among the processors. Within each processor, multiple independent jobs can be processed in multi-programming fashion, and all processors in a system can jointly access the on-line disk files. File Protect Memory, an exclusive Burroughs feature, provides hardware-level protection against interference when two or more programs and/or two or more processors simultaneously attempt to access the same data record on a head-per-track disk file. Thus, the B 2700/3700/4700 systems are particularly well suited for installations where two or more processors, each with its own dedicated workload, must share a common data base. Considerable flexibility is provided for reconfiguring the system resources, through both manual switching and (for disk files and tape drives connected through electronic exchange units) under program control.

PROCESSOR MODELS

Burroughs announced the first five models of the B 4700 Series — the B 4704, 4711, 4712, 4713, and 4714 — on October 20, 1971, and simultaneously began making customer deliveries of the system and its supporting software. This rare achievement was possible because (1) ▷

▶ “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 a single 2-digit “syllable” consisting of an op code only. Each instruction may contain from 0 to 3 memory addresses.

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

MAIN STORAGE

STORAGE TYPE: Magnetic core in B 2700 and B 4700 systems; MOS/LSI semiconductor in B 3700 systems.

CAPACITY: See table and price list.

CYCLE TIME: See table.

CHECKING: In B 2700 and B 4700 systems, a parity bit with each byte is generated during writing and checked during reading. In B 3700 systems, the semiconductor memory 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 3 digits of generated memory addresses are checked to ascertain that they fall within the range defined by these two registers. ▶

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CHARACTERISTICS OF THE B 4700 SYSTEMS

	B 4704	B 4708	B 4711	B 4731	B 4712	B4732	B 4713	B 4733	B 4714	B 4734
CENTRAL PROCESSORS										
No. of processors per system	1	1	1	1	2	2	3	3	4	4
Processor cycle time, nanoseconds	250	250	250	250	250	250	250	250	250	250
Add time(5 digits), microseconds	17*	17*	17*	17*	17*	17*	17*	17*	17*	17*
Multiply time(5 digits), microseconds	91*	91*	91*	91*	91*	91*	91*	91*	91*	91*
MAIN STORAGE										
Type of storage	Core	Core	Core							
Minimum capacity, bytes	150,000	150,000	150,000	150,000	300,000	300,000	450,000	450,000	600,000	600,000
Maximum capacity, bytes	500,000	500,000	500,000	500,000	1,000,000	1,000,000	1,500,000	1,500,000	2,000,000	2,000,000
Increment size, bytes	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Cycle time, microseconds	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Bytes fetched per cycle	2	2	2	2	2	2	2	2	2	2
I/O CONTROL										
No. of I/O channels—standard	8	8	10	10	18	18	26	26	34	34
No. of I/O channels—maximum	20	20	20	20	40	40	60	60	80	80
Type B channels—standard	4	4	5	5	10	10	15	15	20	20
Type B channels—maximum	10	10	10	10	20	20	30	30	40	40
Maximum total I/O data rate, bytes/second	2,000,000	4,000,000	2,000,000	4,000,000	4,000,000	8,000,000	6,000,000	12,000,000	8,000,000	16,000,000
File Protect Memory facility	Optional	Optional	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard
Disk File Exchanges (standard)	0	0	1	1	1	1	1	1	1	1
Disk File Controls (standard)	0	0	1	1	2	2	3	3	4	4
AVAILABLE PERIPHERALS										
20-msec Disk File storage	Yes	Yes	Yes							
23-msec Disk File storage	Yes	Yes	Yes							
40-msec Data Memory Banks	Yes	Yes	Yes							
Disk pack drives	Yes	Yes	Yes							
Data Communications Processor	Yes	Yes	Yes							

*Estimated

➤ the B 4700 is completely program-compatible with the earlier B 2500 and B 3500 systems, and (2) the B 4700 is an improved successor to the B 4500 system, which Burroughs announced in March 1970 but elected not to manufacture. Customers who ordered a B 4500 system will instead receive a B 4700, which is priced about the same as the B 4500 and offers a number of worthwhile new features.

The B 4700 has an expanded addressing structure and instruction repertoire which include the B 2500/3500 addressing structure and instruction repertoire as a subset. Thus, a B 4700 can directly execute all programs written for the smaller systems. Internal speed of the B 4700 will average about 2.3 times that of the B 3500 in typical business applications. The specific differences between the B 4700 and the B 3500 can be summarized as follows:

- The B 4700 has a core cycle time of 500 nanoseconds per 2-byte access—twice the speed of the B 3500.
- The B 4700 processor cycling speed has also been doubled, to 4 million cycles per second.
- The B 4700 has a high-speed address memory with a 50-nanosecond access time—again twice as fast as the B 3500.

➤ CENTRAL PROCESSORS

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

INDIRECT ADDRESSING: Can be specified within the first digit of any instruction address field. If so, 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 instructions provide for efficient arithmetic, comparison, and data movement operations on variable-length operands in either 4-bit numeric or 8-bit alphanumeric mode. Included are 3-address add, subtract, multiply, and divide commands and 2-address add and subtract commands, as well as convenient edit, search, and translate instructions. No binary arithmetic is possible, but logical AND, OR, and NOT instructions are included.

Floating-point decimal arithmetic is an optional feature for all models. In B 2700 systems, variable-length operands are used in all floating-point instructions. B 3700 and B 4700 systems include an additional set of floating-point instructions that use fixed-length operands and operate at far higher speeds.

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

INSTRUCTION TIMES: The table shows the add times and multiply times for 3-address instructions operating on signed 5-digit fields.

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- ▷ ● The B 4700 uses a “new generation” of CTL integrated circuits and MSI (medium-scale integration) devices for greater speed and economy.
- The B 4700 uses hard-wired circuits to control its logic sequences, whereas the B 3500 uses read-only memory.
- The B 4700 has a 4-digit parallel adder, whereas the B 3500 uses a 1-digit adder.
- The B 4700 has a redesigned Instruction Fetch process that reduces the number of processor cycles required to execute most instructions.
- The B 4700 offers a new fixed-length floating-point arithmetic capability in addition to the B 3500’s variable-length floating-point instructions. A new FORTRAN compiler that utilizes the new instructions will enable the B 4700 to execute most FORTRAN-coded scientific programs from 6 to 20 times as fast as the B 3500—though in this case direct object-program compatibility with the B 3500 will be sacrificed. (An alternative FORTRAN compiler preserves full compatibility.)

In May 1972, Burroughs greatly expanded and updated its medium-scale computer line by announcing the B 2700 Series, the B 3700 Series, and five more models in the B 4700 Series.

The five new B 4700 models — the B 4708, 4731, 4732, 4733, and 4734 — differ from their predecessors only in their input/output subsystems, where the maximum total I/O data rate has been doubled to 4 million bytes per second for each central processor. It seems unlikely that the previous maximum data rate of 2 million bytes per second represented a significant performance limitation for very many potential users — but, in any case, the higher I/O capacity is now available for those installations that need it and are willing to pay for it. Customer deliveries of the five new B 4700 models are scheduled to begin in January 1973.

The B 3700 uses a somewhat slower version of the B 4700 central processor, with the same expanded instruction set. But in the B3700, the processor is coupled to a new MOS/LSI semiconductor main memory with a 650-nanosecond cycle time per 2-byte access. The net result is internal processing speed that falls midway between the B 2700 and B 4700 systems and is about 1.5 times as fast as the earlier B 3500. The B 3700 is offered in one single-processor and one dual-processor model. Customer deliveries are scheduled to begin in December 1972.

The B 2700 Series uses essentially the same central processors as the earlier B 2500 systems; the changes consist mainly of price/performance improvements, a ▷

▶ INPUT/OUTPUT CONTROL

I/O CHANNELS: The table shows the standard and maximum number of channels available for each system.

CONFIGURATION RULES: One I/O channel is required for each I/O control unit, and each type of peripheral device requires a different control unit. There are two types of I/O channels, designated Type A and Type B. In general, Type A channels are used for the slower I/O devices (card readers, punches, printers, etc.), while Type B channels are required for the faster or more complex peripherals (magnetic tape, disk files, communications, etc.).

SIMULTANEOUS OPERATIONS: One input or output operation on each installed I/O channel can occur simultaneously with computing. Maximum total I/O data rates are shown in the table.

I/O INTERFERENCE: Only one core storage cycle is required for each unit of I/O data transferred (1 character at a time for Type A channels, and 2 characters in parallel for Type B channels).

MASS STORAGE

HEAD-PER-TRACK DISK FILES: Burroughs offers three models of its fixed-head disk files, with varying capacities and access times, for use with the B 2700, B 3700, and B 4700 systems. All models utilize non-interchangeable disks and have a fixed read/write head serving each data track. Various mixes of these models can be included in a single disk subsystem through the use of appropriate control units, electronic units, and Disk File Exchange units. Moreover, a single disk subsystem can include one, two, or four control units, each capable of servicing any of the connected disk files. Simultaneous disk read and write operations can occur in a subsystem with two or more control units. (The B 9370 Systems Memory units, which provide 1 million or 2 million bytes of storage on a single disk with a 17-millisecond average access time, are no longer available with new system orders.)

The B 9372-12 Disk File provides 10 million bytes of storage with an average access time of 20 milliseconds. Maximum data transfer rate is 235,000 bytes/sec. Data is recorded in 100-byte segments. The B 9372-12 includes one Disc File Electronics Unit (DFEU) and can accommodate up to four B 9374-12 Additional 10-Million-Byte Storage Increments. Additional DFEU’s can be used if desired to increase the number of simultaneous access paths to the disk files.

The B 9373-3 Disk File provides 20 million bytes of storage with an average access time of 23 milliseconds. The B 9373-3 includes one DFEU and can accommodate up to four B 9374-3 Additional 20-Million-Byte Storage Increments. Additional DFEU’s can be used to increase the number of access paths. The B 9373-3 cannot be used with a B 2731, B 2741, or B 2751 system.

The B 9375-4 Head-per-Track Memory Bank provides 100 million bytes of storage with an average access time of 40 milliseconds. Data is recorded in 100-byte segments, and maximum data transfer rate is 216,000 bytes/sec. The capacity can be expanded to a maximum of 2 billion bytes per subsystem through the use of B 9376-5 Additional 20-Million-Byte Storage Increments. The Memory Bank prices include one DFEU for each 100 million bytes ▶

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➤ wider range of model choices, a dual-processor configuration (the B 2772), and availability of the Data Communications Processor. The B 2700 has the same instruction set as the B 2500 and lacks the expanded addressing structure and instruction repertoire of the faster B 3700 and B 4700 central processors. B 2700 customer deliveries are scheduled to begin in August 1972.

HARDWARE FEATURES

Within the B 2700/3700/4700 systems, data can be represented in the form of variable-length fields composed of either 8-bit bytes or 4-bit digits. Although the memory word length is two bytes (16 data bits), each 4-bit digit position can be individually addressed. Numeric fields expressed in the 4-bit and 8-bit modes can be combined in decimal arithmetic operations without the need for prior format conversion. No binary arithmetic facilities are included.

The B 2700/3700/4700 central processors operate in either the Normal State or Control State. The Normal State is used for execution of user programs. An interrupt signal causes the processor to enter the Control State and transfer control to the Master Control Program whenever an I/O operation is completed or an abnormal condition is encountered. A group of "privileged" instructions, executable only in the Control State, enable the MCP to initiate I/O operations, control the storage protection registers, set the 6-digit interval timer, and perform other system control functions.

Burroughs has taken several steps toward improved reliability and maintainability in the B 3700 and B 4700 systems. Special test instructions and new diagnostic software aid field engineers in pinpointing malfunctions. Burroughs states that if just 6 percent of the central processor circuitry is "healthy," it will be possible to run basic diagnostic routines that will isolate the problems. A new centralized power supply for each processor and its associated core memory and I/O controls reduces the number of places where malfunctions can occur. The semiconductor main memory in the B 3700 includes an error-correction feature that provides automatic recovery from single-bit memory errors. Most significantly, the high redundancy possible in multiple-processor configurations permits "fail-soft" operation; if one processor fails, the operator can switch the required peripheral devices to another processor and use the MCP's "audit trail" capability to pick up the work load that was being executed by the processor that failed.

The Burroughs "700 Systems" are strongly oriented toward data communications. In addition to the single-line and multi-line communications controls used in the B 2500/3500 systems, B 2700/3700/4700 buyers can choose the new Data Communications Processor (DCP). The DCP is an independently programmed "front-end" ➤

➤ or fraction thereof. Additional DFEU's can be used to increase the number of access paths. The B 9375-4 cannot be used with a B 2731, B 2741, or B 2751 system.

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. 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 may 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.

FPM is a standard component of all multiple-processor B 2700, B 3700, and B 4700 systems and of the single-processor B 4711 and B 4731 systems.

DISK PACK DRIVES: Burroughs offers two basic models of disk pack drives for the B 4700 systems, and the smaller one is also usable with the B 2700 and B 3700 systems. Both units feature two independent disk drives per module and either single or dual access control units. Up to 16 drives can be serviced by one control unit. The comb-style access mechanisms, with one read/write head for each disk surface, are driven by magnetic voice-coil head actuator mechanisms.

Error detection and correction are provided by a block-count check byte (a count of "one" bits for each full track or 180-byte segment) and an 11-bit checking word appended to each 90 bytes of user data. All single-bit errors are detected and corrected, and all multiple-bit errors are detected.

The disk pack drives are software-supported by the MCP for I/O operations in either the full-track or 180-byte segment mode. However, every system must also include at least one of Burroughs' head-per-track Disk Files for systems software residence, and the disk pack drives cannot use the File Protect Memory facility.

The B 9484-3/9485-3/9486-3 Magnetic Actuator Disk Pack Drives (usable with all B 2700/3700/4700 systems except the B 2731, B 2741, and B 2751) are dual-drive units that provide up to 121 million bytes of data storage, 60.5 million bytes per disk pack. Up to 968 million bytes of storage (16 drives) can be provided via a single control unit. Average arm movement time is 30 milliseconds, and average rotational delay is 12.5 milliseconds. Data is recorded at 2200 bits per inch, producing a data transfer rate of 312,500 bytes/second. Data is recorded on an 11-high disk pack, which is physically compatible with the IBM 2316 pack; the packs, however, are not data-compatible with the IBM equivalents. Twenty surfaces are used for data recording.

The B 9484-4/9485-4/9486-4 Magnetic Actuator Disk Pack Drives (usable only with B 4700 systems) are dual-drive units that provide up to 242 million bytes of data storage, 121 million bytes per disk pack. Up to 16 drives, ➤

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➤ processor that can control up to 64 lines and presents a "soft" (i.e., programmable) interface capable of accommodating a wide variety of terminals. Multiple DCP's can be used in a system. The Burroughs product line also includes an audio response system, CRT display systems, on-line banking terminals, general-purpose terminals, remote peripheral controllers, and remote terminal concentrators.

Burroughs offers an unusually wide choice of peripheral equipment for the B 2700/3700/4700 systems. About the only noteworthy current omissions are an optical page reader and a really fast printer comparable to the 2000-lpm IBM 3211. In addition to the full range of B 2500/3500 peripheral equipment, the larger B 2700/3700/4700 systems can include several important new units that were introduced along with the B 4700 in October 1971:

- A disk pack drive subsystem that stores 121 million bytes on each 11-disk IBM 2316-style pack by recording the data at 200 tracks/inch and 4400 bits/inch—twice the density of the IBM 2314 drives in each direction.
- New magnetic tape units that transfer data at up to 400,000 bytes per second—the highest tape speed currently available from any of the major computer manufacturers.
- New Line printers that feature simplified operation and a unique "Forms Self-Align" facility that uses preprinted marks on the edge of the forms in place of the usual tape loop to control the vertical format.
- An Operator Display Console that facilitates operator communications and provides regularly updated displays showing the system's operational status.

B 2700/3700/4700 buyers who need mass storage can choose either head-per-track disk files or disk pack drives. The head-per-track disk files that have been a key element in most Burroughs computer systems for the past decade are still offered in a broad range of capacities and access speeds. Disk pack drives, which were conspicuously absent from the Burroughs product line until late 1970, are now available in two models that provide either two or four times the storage capacity of an IBM 2314 drive. The principal emphasis, however, is still on the head-per-track files, as indicated by the facts that (1) the File Protect Memory capability is applicable only to the head-per-track files, and (2) at least one head-per-track unit is required in every system for systems software residence. Choosing the most suitable type and model of mass storage for a B 2700/3700/4700 installation will require careful consideration of throughput requirements, processing techniques (random vs. sequential), data security, backup considerations, etc.

➤ or 1.936 billion bytes of storage, can be connected to a single control unit. Average arm movement time is 30 milliseconds, and average rotational delay is 12.5 milliseconds. Data is recorded at 4400 bits per inch — twice the density of most competitive units — resulting in a data transfer rate of 625,000 bytes/second. Data is recorded on an 11-high disk pack, which is physically compatible with the IBM 2316 pack; the packs, however, are not data-compatible with the IBM equivalents. First deliveries are scheduled for September 1972.

INPUT/OUTPUT UNITS

MAGNETIC TAPE CLUSTERS: Contain two, three, or four tape drives in a single compact cabinet. The feed and take-up reels for each tape drive are mounted on concentric vertical shafts, with the feed reel directly above the take-up reel. Pinch rollers and short vacuum-column buffers are employed. Each of the tape drives has its own drive mechanism, but they share a common power supply and read/write circuitry. Up to eight tape drives (two clusters) can be connected to a Cluster Control. Two of the drives in a cluster can read and/or write simultaneously if two Cluster Controls and an Exchange unit are used.

Burroughs offers numerous models of the Magnetic Tape Clusters, as listed in the Equipment Prices section of this report. All models use standard 1/2-inch tape, can read either forward or backward, and record in IBM-compatible formats at a tape speed of 22.5 or 45 inches per second. The 9381 series units record in 9-track NRZI mode at 800 bpi and transfer data at either 18,000 or 36,000 bytes/sec; these units can alternatively be equipped to operate in the 7-track NRZI mode at densities of 200, 556, or 800 bpi. The 9382 series units record in 9-track phase-encoded mode at 1600 bpi and transfer data at either 36,000 or 72,000 bytes/sec. The 9383 series units are 9-track models that can operate in either the 800-bpi NRZI or 1600-bpi phase-encoded mode, with data transfer rates of either 18/36KB or 36/72 KB.

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 Controls and an Exchange unit are employed.

Seven models of the free-standing tape units are available, with the following recording modes, tape speeds (in inches per second), recording densities (in bits per inch), and data transfer rates (in bytes or characters per second):

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

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

B 9392: 9 tracks; 90 ips; 200/800 bpi; 18,000 or 72,000 bytes/sec.

B 9393-1: 9 tracks; 90 ips; 1600 bpi; 144,000 bytes/sec.

B 9393-3: 9 tracks, 150 ips; 1600 bpi; 240,000 bytes/sec. ➤

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➤ SOFTWARE AND SUPPORT

The B 2700/3700/4700 systems' compatibility with the B 2500/3500 systems enables them to use all the software that has been developed and refined during the five-year operational history of the earlier systems. This includes the comprehensive Master Control Program, which supervises and controls all of the system's operations, and compilers for COBOL, FORTRAN, BASIC, and RPG — but not for ALGOL or PL/I to date. Most B 2700/3700/4700 installations will select COBOL for their business programming and FORTRAN for scientific applications.

To augment the existing B 2500/3500 software, Burroughs is developing several new software facilities primarily for the new systems. These include an improved MCP, new FORTRAN and COBOL compilers to utilize the expanded hardware facilities of the B 3700 and B 4700 processors, an improved BASIC compiler, a compiler for the new, machine-oriented Burroughs Program Language (BPL), and a Remote Job Entry system to enable remote batch terminals to access the computers.

All software support for the B 2700/3700/4700 systems is built around the MCP, the integrated operating system that complements the hardware to create an unusually effective environment for multiprogrammed operation. Perhaps the most striking feature of the MCP is the fact that it is truly user-oriented and much easier to understand and use than most of the competitive operating systems. The MCP receives its orders through unusually straightforward messages entered via control cards or the console keyboard. The new, improved version, MCP V, is already in use; it supports shared data bases on head-per-track disk files and yields significant improvements in operational efficiency.

In May 1972, Burroughs partially unbundled the B 2700/3700/4700 software by placing separate license fees on most of the application programs and on certain program development aids and utility routines. The MCP and compilers, along with normal technical support and training, are still offered on a bundled basis at no additional cost.

COMPATIBILITY

Through the B 2700/3700/4700 systems are billed as members of the Burroughs "700 Systems" computer family, there is no object-level program compatibility between them and the larger B 5700, B 6700, or B 7000 systems. Burroughs, however, strongly recommends programming in COBOL or FORTRAN and provides "filter" programs that facilitate the conversion of COBOL or FORTRAN programs from one Burroughs computer to another. Moreover, the latest COBOL Compiler for the B



The B 9340-1 Operator Display Console facilitates man/machine communications and provides regularly updated status displays that list the active programs in the multiprogramming mix.

➤ B 9394-1: 7 tracks; 120 ips; 200/556/800 bpi; 24,000 66,700, or 96,000 char/sec.

B 9394-2: 9 tracks; 120 ips; 200/800 bpi; 24,000 or 96,000 bytes/sec.

B 9495-5 & B 9495-6 MAGNETIC TAPE UNITS: These high-performance 9-track units, usable only with B 4700 systems, 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 "co-axial" hub mounts the feed reel directly in front of the take-up reel, reducing the overall width of the unit to just 24 inches.

A basic B 9495-5 or B 9495-6 subsystem consists of a Dual I/O Control (which permits simultaneous read/write operations), a Basic Electronics/Exchange, and up to 8 tape drives. The addition of an Electronics/Exchange Extension permits the use of a second Dual I/O Control and up to 16 tape drives. B 9495-5 and B 9495-6 Tape Units cannot be intermixed in the same subsystem.

B 9110 CARD READER: Reads 80-column cards serially by column, on demand, at up to 200 cpm. EBCDIC is the standard card code, and BCL or binary cards can also be read. The feed hopper and stacker hold 450 cards each.

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.

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➤ 6700/7700 systems accepts B 2700/3700/4700 ANS COBOL directly, eliminating the need for filtering.

The B 2700/3700/4700 systems use the same byte-oriented data structure, EBCDIC internal code, and magnetic tape formats as the IBM System/360 and 370 computers, but there is no direct program compatibility between them at the machine-language or assembly-language level. Most programs written in ANS COBOL, FORTRAN, or RPG for the IBM computers, however, should be usable on a B 2700/3700/4700 system without undue conversion difficulty. COFIRS (COBOL From IBM RPG Specifications) has proven to be a particularly effective conversion aid for IBM 360/20 users.

BURROUGHS VS. THE COMPETITION

The 18 models in the B 2700/3700/4700 family, ranging from a 30K B 2731 system at about \$5,000 per month to a 4-processor B 4734 system at about \$75,000 per month, should provide a suitable choice for nearly every medium-scale computer buyer. The new systems represent attractive upgrades for current users of Burroughs' own "500 Systems," as well as for many users of IBM System/360 Models 20 through 50 and other competitive systems.

The B 2700 systems will be marketed as program-compatible upgrade machines for current users of the Burroughs B 2500 systems and as replacements for the IBM 360/20, 360/25, and 360/30 and for similarly-priced models in the Honeywell Series 200, NCR Century Series, and UNIVAC 9000 Series. The internal processing speed of the B 2741 and B 2761 processors is closely comparable to that of the IBM 360/30, while the B 2751 and B 2771 processors are in the same performance class as the 360/40 — and the Burroughs equipment is considerably lower in price.

The B 3700 and B 4700 will be marketed as program-compatible upgrade machines for B 3500 users and as replacements for IBM System/360 Model 40 and 50 systems and for competitive computers in their price class. For 360/50 users, the B 4700 will deliver substantially higher performance, usually at a saving in cost. In most sales situations, the B 4700 will be in head-to-head competition with the IBM System/370 Model 145. Although Burroughs expects the B 4700 to "dramatically outperform the 370/145 in typical user applications", the DATAPRO 70 staff judges the two systems, in equivalent single-processor configurations, to be closely comparable in both performance and price. One significant Burroughs advantage, however, is its more efficient memory management and multiprogramming techniques, which will, for example, often enable a 200K B 4700 to process a larger workload than a 262K 370/145.

The B 2700/3700/4700 systems combine time-tested hardware and software concepts with impressive price/ ➤

➤ **B 9112 CARD READER:** Reads up to 1400 cpm. Otherwise, has the same characteristics and features as the B 9111 Card Reader described above.

B 9113 CARD READER: Reads up to 475 cpm. Otherwise, has the same characteristics and features as the B 9111 Card Reader described above.

B 9210 CARD PUNCH: Punches and read-checks 80-column cards at 100 cpm. EBCDIC is the standard card code, and BCL or binary cards can also be punched. The feed hopper and single stacker hold 800 cards each. The associated control unit contains a full-card buffer. The B 9210 is not available with new B 3700 or B 4700 systems.

B 9212 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.

B 9120 PAPER TAPE READER: Reads 5-, 6-, 7-, or 8-level punched tape at 500 or 1000 characters per second. The lower speed must be used for fanfold or metallized Mylar tape. Handles reels either 5.5 or 7 inches in diameter. A standard channel-select plugboard and optional Input Code Translator permit wide flexibility in codes.

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.

LINE PRINTERS (B 2700 SYSTEMS): Eight printers of the conventional rotating-drum type provide printing speeds ranging from 475 to 1100 lines per minute for the B 2700 systems. All models have a tape-controlled carriage capable of handling continuous forms 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. Characteristics of the various models are as follows:

B 9240-4: 475 lpm; 120 or 132 print positions.

B 9240-5: 700 lpm; 120 or 132 print positions.

B 9242-1: 860 lpm; 120 or 132 print positions.

B 9242-2: 725 lpm; 120 or 132 print positions; OCR "A" numeric and standard alphabetic character set.

B 9242-3: 725 lpm; 120 or 132 print positions; OCR "B" alphanumeric set.

B 9243-1: 1100 lpm; 120 or 132 print positions.

B 9243-2: 900 lpm; 120 or 132 print positions; OCR "A" numeric and standard alphabetic character set.

B 9243-3: 900 lpm; 120 or 132 print positions; OCR "B" alphanumeric set.

The B 9242 and B 9243 models can be equipped with an optional high-speed skipping feature (75 inches per ➤

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➤ performance capabilities and unusually effective facilities for multiprogramming, data communications, mass storage, and multiple-processor systems. As such, they deserve careful consideration by medium-scale computer buyers. □

➤ second) and/or a "printer memory" that reduces the demands imposed upon the processor during printing.

LINE PRINTERS (B 3700/4700 SYSTEMS): For use with B 3700 and B 4700 systems, Burroughs offers improved versions of the earlier B 9242 and B 9243 printers described above. Characteristics of the six new models are as follows:

B9242-11: 860 lpm; 120 or 132 print positions.

B 9242-12: 725 lpm; 120 or 132 print positions; OCR "A" numeric and standard alphabetic set.

B 9242-13: 725 lpm; 120 or 132 print positions; OCR "B" alphanumeric set.

B 9243-11: 1100 lpm; 120 or 132 print positions.

B 9243-12: 900 lpm; 120 or 132 print positions; OCR "A" numeric and standard alphabetic set.

B 9243-13: 900 lpm; 120 or 132 print positions; OCR "B" alphanumeric set.

These new printers incorporate a number of engineering improvements designed to provide increased reliability, print quality, and ease of operation. The changes include new hammer construction, new tractor gears, new power supply, new control knobs, and new end-of-paper sensing device. A new "paper stabilizer" holds the paper motionless during each print cycle by activating six stabilizing arms located below the print station.

The new printers feature a Burroughs innovation called "Forms Self-Align." With this feature, forms are advanced under program control to printed marks on the right-hand edge of the forms, eliminating the need for a format control tape. The three standard marks are line, field, and end-of-page. The Burroughs Business Forms and Supplies Group offers both stock and custom forms with the required Forms Self-Align markings. A switch allows the operator to select vertical format control by means of either the Forms Self-Align marks or a conventional 12-channel paper tape loop.

B 9244 TAPE LISTER: Produces printed listings of documents read by a MICR Sorter-Reader on 6, 12, or 18 adding-machine tapes, each 2.5 inches wide, which can be individually advanced. The B 9244-1 Master Lister has 6 tapes, and one or two 6-tape B 9244-2 Slave Listers can be connected to it. Maximum printing speed is 1565 lpm when printing is restricted to the digits 0 through 9 and six special characters, or 800 lpm when the full 40-character alphanumeric set is used.

B 9340 CONSOLE PRINTER/KEYBOARD: A Teletype Keyboard Send/Receive unit, used to provide keyboard input and console printouts.

B 9340-1 OPERATOR DISPLAY CONSOLE: Provides console input via a typewriter-style keyboard and output via a CRT display. Has a 960-character buffer and displays up to twelve 80-character lines of data. A B

2700/3700/4700 central processor can be equipped with either a B 9340 Printer/Keyboard, a B 9340-1 Display Console, or both. Multiple-processor systems can have one B 9340-1 Display Console per processor. The B 9340-1, however, cannot be used with a B 2731, 2741, or 2751 system. Software support for the B 9340-1 (which adds 8K bytes to the MCP main storage requirements) interrogates the MCP tables every 10 seconds to determine the system status, formats the information, and displays it on the screen. A log of all console messages is maintained on disk and listed on a line printer upon request.

MICR READER-SORTERS: Read MICR-encoded documents at up to 1565 items per minute. Can also operate in demand mode, feeding one document at a time at up to 400 items per minute. Models B 9131 and B 9132 have 13 and 16 pockets, respectively. Both models are also usable for off-line sorting. Optional features include an endorser, validity checking, and an item counter. The B 9130 is a similar, 13-pocket unit designed solely for off-line use. The B 9131-1 is a 13-pocket, on-line model with a lower rated speed of 1000 items per minute.

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.

B 9410 PERIPHERAL SWITCHING UNIT: Permits peripheral devices to be manually switched between two control units, which may be connected to different central processors. (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.)

COMMUNICATION CONTROLS

SINGLE-LINE CONTROL: Provides a connection between a single Type B I/O channel and a single communications line. Contains a one-character buffer. Requires an appropriate line adapter, which determines transmission rate, code sensitivity, and character structure. Numerous adapters permit half-duplex communication with a wide range of equipment over dialed, leased, or directly connected lines at speeds of 74.2 to 9600 bits per second.

MULTI-LINE CONTROL: Permits the connection of multiple simultaneously-operating communications lines to a pair of Type B I/O channels. Requires an appropriate line adapter for each line. The basic Multi-Line Control houses up to 4 line adapters. Optional 8-line extensions permit a total of up to 36 lines to be connected. A "scratchpad" memory holds control information and provides a one-character buffer for each line. Numerous adapters permit half-duplex communication with a wide range of equipment over dialed, leased, or directly connected lines at speeds of 74.2 to 9600 bits per second. The Multi-Line Control cannot be used with a B 2731, 2741, or 2751 system.

DATA COMMUNICATIONS PROCESSOR: The DCP is a small stored-program computer that performs the specialized functions associated with the transmission and reception of data, including editing, line discipline, and line handling. The basic DCP has 16,384 bytes of 1.5-microsecond core storage, expandable in 4096-byte increments to a maximum of 32,768 bytes. The basic

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DCP includes a Multi-Line Control capable of interfacing up to 16 communications lines; this capacity can be expanded in 16-line increments to a maximum of 64 lines. An appropriate line adapter is required for each line. Multiple DCP's can be used in a system to handle more lines and/or provide increased reliability. Moreover, each DCP can be connected to multiple central processors. Data is transferred between the DCP and the central processor at the rate of 50,000 bits per second. The basic DCP includes a console printer and keyboard, and a 200-cpm card reader can be added.

AUDIO RESPONSE SYSTEM: Provides responses, in recorded human-voice form, to digital inquiries from push-button telephones. Accommodates up to 128 lines, in 2-line increments. Spoken words or phrases are recorded on film wrapped around a revolving drum. The drum contains 63 audio tracks, each capable of storing either one phrase (up to 1.5 seconds in length), the same word recorded three times, or three different words. The Audio Response Generator is used in conjunction with a Multi-Line Control.

SOFTWARE

MASTER CONTROL PROGRAM: The principal component of Burroughs software support for the B 2700/3700/4700 systems is the MCP, a modular operating system that schedules and controls all operations of the system. 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 or paper tape reader, and a console typewriter or display console. A high-speed trace option adds another 7.5K bytes to the main memory requirements, and support for the B 9340-1 Operator Display Console requires another 8K bytes. In its largest version, the MCP handles all standard peripherals plus MICR and multi-line data communications, controls up to 80 simultaneous programs, and accommodates up to 80 I/O devices and an 80-request I/O queue.

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 core storage available. When the end of a job is reached, the remaining programs in core storage are compacted to maximize the contiguous core area

available for loading and initiating one or more new programs.

To schedule I/O operations, the MCP maintains tables that show the status of each I/O unit and the priority of each I/O request awaiting initiation. Disk files can be processed either sequentially or randomly.

Burroughs states that the newest version of the Master Control Program, called MCP V, yields a 10 to 15 percent increase in overall system throughput over its predecessor. Among the new features of MCP V are: (1) support of the File Protect Memory hardware, enabling multiple programs to open and share the same head-per-track 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 V is currently in operation and will be supported along with the earlier CP 14 and CP 40 versions of the MCP for smaller configurations. MCP V can handle "a good level of multiprogramming and several communications lines" with a main memory residence requirement of about 35K bytes; additional memory is required to support the shared-disk and STOQUE facilities.

COBOL: Three COBOL compilers are available for operation under the B 2700/3700/4700 MCP. 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, runs only on the B 3700 and B 4700 central processors, and makes use of the extended addressing and 4-digit adders of these processors to generate 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 existing B 2500/3500 FORTRAN compiler, called "FORTRAN", can be used without change on the B 2700/3700/4700 systems. It requires 27K bytes of main memory (in addition to the MCP requirements) ▶

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► 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.

Two newer FORTRAN compilers, called "FORT IV" and "XFORTN," provide expanded language facilities which are compatible with IBM FORTRAN IV Level H, include the full ANS FORTRAN language plus numerous extensions, and are upward-compatible with the FORTRAN compilers for the larger 700 Series systems. Both compilers require 45K bytes of main memory. FORT IV runs only on the B 3700 and B 4700 central processors and makes use of their fixed-length floating-point arithmetic instructions, extended addressing capabilities, and 4-digit adders to achieve significantly higher object program execution speeds. XFORTN makes the same extended language capabilities available to users of the slower B 2500, B 2700, and B 3500 processors.

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.

A new BASIC compiler, scheduled for delivery in March 1973, will support a larger number of users, allow larger program sizes, and include new functional capabilities.

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.

An earlier Burroughs Report Program Generator for the B 2500/3500 systems is available to B 2700/3700/4700 users but is no longer being actively supported. The earlier RPG is not compatible with IBM RPG specifications and was deemphasized when it became apparent that most B 2500/3500 installations had elected to program exclusively in COBOL.

ASSEMBLERS: Assembler Language is the symbolic programming language used to write machine-oriented programs for the B 2700, B 3700 and B 4700. 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 may 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 procedures are provided by the MCP.

A new Burroughs Program Language (BPL) Compiler, delivered in April 1972, enables B 2700/3700/4700 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 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.

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.

Disk-FORTE is a file management system that enables a user to structure up to 99 files on either disk packs or head-per-track disk files and establish as many as 20 relations between any two of these files. The files may have any of four distinct types of organization: indexed sequential, random, indexed random, and unordered. Appropriate search strategies are used to access the data records in each type of file. "Pointers" can be defined to establish chaining and linking network structures among the files. Disk-FORTE generates COBOL source code which is compiled along with the user's application programs.

The CANDE (Command and Edit) program enables users at remote terminals 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. A single copy of the CANDE program in core storage can handle up to 99 remote compilations.

The Network Definition Language (NDL) enables users to generate customized data communications control programs. The user can either insert his own COBOL logic for message control functions or use a standard Message Control System (MCS). The NDL generator runs on a B 2700/3700/4700 system and produces communications control programs for execution by both the Central Processor and the Data Communications Processor (if used).

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 process.

The Source Language Library Maintenance system facilitates the maintenance of source-language programs residing on magnetic tape files. The system provides facil- ►

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ities for either temporary or permanent program changes, for test compilations and executions, and for program listings.

The Time Analysis and Billing System (TABS) utilizes the MCP-created system log to analyze and disburse the costs of the computer and related services. The system consists of 7 daily programs, a Cost Distribution program that can be run at any time, and 2 optional monthly programs.

Burroughs offers a number of conversion programs designed to assist users in converting from other Burroughs and IBM computers to the B 2700/3700/4700 systems. Translation programs are available to facilitate conversions from: (1) Burroughs B 500 or B 5500 COBOL to B 2700/3700/4700 COBOL; (2) Burroughs B 300/500 Basic or Advanced Assembler to B 2700/3700/4700 Assembler; (3) IBM System/360 RPG to B 2700/3700/4700 COBOL; and (4) IBM 1400 Series Autocoder or SPS to B 2700/3700/4700 COBOL. Also available are simulators that enable a B 2700/3700/4700 to execute certain object programs written for Burroughs B 300/500 or IBM 1401/1440/1460 computers.

APPLICATION PROGRAMS: The steadily expanding array of Burroughs applications software for the B 2700/3700/4700 systems currently includes the following facilities:

- Advanced Linear Programming System (ALPS)
- Assist (integrated statistical system)
- Burroughs Hospital Administrative System (BHAS)
- Burroughs Inventory Control System (BICS)
- Burroughs Numerical Control System (ADAPT)
- Burroughs On-Line Order Entry System
- Commercial Bank Item Processing System
- Central Information File System
- Commercial Loan Accounting System
- Demand Deposit System
- Federal Reserve Bank Item Processing System
- GASP (FORTRAN-based discrete-change simulation language)
- Installment Loan System
- On-Line Financial System (savings and loan)
- Personal Trust System
- Production Control System (PCS)
- Project Oriented Management Information System (PROMIS)
- Time Deposit System.

PRICING

EQUIPMENT: The following systems are representative of the types of B 2700/3700/4700 systems that are likely to be commonly installed and are supported by the standard Burroughs software. 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.

BASIC B 2731 TAPE/DISK SYSTEM: Consists of 30K B 2731 Central Processor with 6 I/O channels, Console with Printer and Keyboard, 10 million bytes of 20-millisecond Disk File storage, B 9381-12 two-drive Magnetic Tape Cluster (18KB), 475-lpm Printer, and 475-cpm Card Reader. Monthly rental and purchase prices are approximately \$5,100 and \$236,000, respectively.

B 3771 TAPE/DISK SYSTEM: Consists of 100K B 3771 Central Processor with 8 I/O Channels, Console with Printer and Keyboard, 60 million bytes of 23-millisecond Disk File storage, B 9382-14 four-drive Magnetic Tape Cluster (36KB), 860-lpm Printer, 800-cpm Card Reader, and 150-cpm Card Punch. Monthly rental and purchase prices are approximately \$14,600 and \$691,000, respectively.

B 4711 TAPE/DISK SYSTEM: Consists of 250K B 4711 Central System with 10 I/O Channels and Floating-Point Arithmetic option, Operator Display Console, B 9372-12 Disk File storage (10 million bytes), B 9375-4 Head-per-Track Memory Bank (100 million bytes), eight B 9393-1 Magnetic Tape Units (144KB) and two tape controls, 1100-lpm Printer, 1400-cpm Card Reader, and 300-cpm Card Punch. Monthly rental and purchase prices are approximately \$25,900 and \$1,177,000, respectively.

DUAL-PROCESSOR B 4732 TAPE/DISK SYSTEM: Consists of B 4732 Central System (2 processors, each equipped with 400K bytes of core memory, Floating Point Arithmetic, and an Operator Display Console), 18 I/O channels, B 9373-3 Head-per-Track Disk File (60 million bytes), six-drive B 9485-4 Disk Pack Drive subsystem with dual control units (726 million bytes), eight B 9495-6 Magnetic Tape Units (400 KB) with dual control units, two 1100-lpm Printers, two 1400-cpm Card Readers, and two 300-cpm Card Punches. Monthly rental and purchase prices are approximately \$57,000 and \$2,756,000, respectively.

SOFTWARE: On May 4, 1972, Burroughs announced a Program Products marketing plan covering most of the application programs and certain program development aids and utility routines for the B 2700/3700/4700 systems. The Program Products are offered under either an Unlimited-Time License Plan, for a one-time charge followed by an annual maintenance fee, or a Limited-Time License Plan, with monthly payments during either a 3-year or 5-year lease term. The available Program Products and their associated license fees are listed under "Software Prices" at the end of this report. The B 2700/3700/4700 Master Control Program, compilers, and all other software facilities not classified as Program Products are still available to users at no extra cost.

TECHNICAL SUPPORT: The B 2700/3700/4700 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 eight consecutive hours a day, Monday through Friday. (No 176-hour nor Measured Time Usage lease plans are available for the B 2700/3700/4700 systems.)

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 70% of the rental paid during the first 6 months and 40% of the rental paid during the next 6 months to be applied toward the purchase price at any time during the lease period. ■

Burroughs B 2700, B 3700, & B 4700 EQUIPMENT PRICES

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>Rental (1-year lease)*</u>
B 2700 PROCESSORS AND MAIN STORAGE				
B 2731	Central Processor, 6 I/O Channels, and 30KB Core Memory	77,490	169	1,670
B 2741	Central Processor, 6 I/O Channels, and 30KB Core Memory	118,910	169	2,530
B 2751	Central Processor, 6 I/O Channels, and 30KB Core Memory	159,330	169	3,390
B 2761	Central Processor, 6 I/O Channels, and 60KB Core Memory	175,310	194	3,730
B 2771	Central Processor, 6 I/O Channels, and 60KB Core Memory	215,730	195	4,590
B 2772	Two Central Processors, each with 6 I/O Channels and 60KB Core Memory; 2 Disk File Controls and 1 Exchange, File Protect Memory, and Auxiliary Power Cabinet	500,390	577	10,610
B 2098	Optional Independent Auxiliary Power Cabinet (for File Protect Memory and/or Disk File or Magnetic Tape Exchange units)	12,000	10	250
B 2099	Floating-Point Arithmetic feature	4,800	7	54
B 2301	Additional Type A I/O Channel	1,296	5	27
B 2302	Additional Type B I/O Channel	2,592	10	54
B 2342	Console (standing-level; required with all systems)	720	-	15
B 2340-1	Console Printer Control	3,888	15	81
B 9340	Console Printer and Keyboard	2,640	15	55
B 2341	Operator Display Console Control	10,800	19	225
B 9340-1	Operator Display Console	9,548	33	217
Memory Expansion Modules for B 2731/2741/2751:				
B 2001-2	Expansion to 40,000 Bytes	18,800	10	400
B 2002-2	Expansion to 50,000 Bytes	37,600	15	800
B 2003-2	Expansion to 60,000 Bytes	56,400	21	1,200
Memory Expansion Modules for B 2761/2771/2772:				
B 2009-2	Expansion to 90,000 Bytes	25,380	21	540
B 2012-2	Expansion to 120,000 Bytes	50,760	41	1,080
B 2015-2	Expansion to 150,000 Bytes	76,140	62	1,620
B 2018-2	Expansion to 180,000 Bytes (B2771/2772 only)	104,340	93	2,220
B 2021-2	Expansion to 210,000 Bytes (B 2771/2772 only)	132,540	123	2,820
B 2024-2	Expansion to 240,000 Bytes (B 2771/2772 only)	160,740	154	3,420
B 2030-2	Expansion to 300,000 Bytes (B 2771/2772 only)	217,140	216	4,620
B 3700 PROCESSORS AND MAIN STORAGE				
B 3771	Central Processor, 100KB IC Memory, and 8 I/O Channels	349,920	328	8,200
B 3772	Two Central Processors, each with 100KB IC Memory; 18 I/O Channels, 2 Disk File Controls and 1 Exchange, File Protect Memory, and Auxiliary Power Cabinet	744,185	821	17,905
B 3098	Optional Independent Auxiliary Power Cabinet (for File Protect Memory and/or Disk File or Magnetic Tape Exchange units)	12,000	10	250
B 3099	Floating-Point Arithmetic feature	7,200	10	150
B 3301	Additional Type A I/O Channel	3,360	10	70
B 3302	Additional Type B I/O Channel	4,560	10	95
B 3342	Console (standing-level; required with all systems)	1,440	-	30
B 3340-1	Console Printer Control	6,480	15	135
B 9340	Console Printer and Keyboard	2,640	15	55
B 3341	Operator Display Console Control	10,800	19	225
B 9340-1	Operator Display Console	9,548	33	217
Memory Expansion Modules for B 3771/3772:				
B 3015-1	Expansion to 150,000 Bytes	43,200	31	970
B 3020-1	Expansion to 200,000 Bytes	86,400	77	1,940
B 3025-1	Expansion to 250,000 Bytes	143,560	123	2,910
B 3030-1	Expansion to 300,000 Bytes	200,720	185	4,080
B 4700 PROCESSORS AND MAIN STORAGE				
B 4704-1	Central Processor, 150KB Core Memory, and 8 I/O Channels	393,120	364	10,050
B 4711-1	Central Processor, 150KB Core Memory, 10 I/O Channels, 1 Disk File Control and 1 Exchange, File Protect Memory, and Auxiliary Power Cabinet	472,400	540	11,700
B 4712-1	Two Central Processors, each with 150KB Core Memory; 18 I/O Channels, 2 Disk File Controls and 1 Exchange, File Protect Memory, and Auxiliary Power Cabinet	866,345	929	21,680
B 4713-1	Three Central Processors, each with 150KB Core Memory; 26 I/O Channels, 3 Disk File Controls and 1 Exchange, File Protect Memory, and Auxiliary Power Cabinet	1,279,935	1,318	32,155
B 4714-1	Four Central Processors, each with 150KB Core Memory; 34 I/O Channels, 4 Disk File Controls and 1 Exchange, File Protect Memory, and Auxiliary Power Cabinet	1,693,530	1,707	42,630
B 4708	Central Processor, 150KB Core Memory, and 8 I/O Channels	494,305	383	10,695
B 4731	Central Processor, 150KB Core Memory, 10 I/O Channels, 1 Disk File Control and 1 Exchange, File Protect Memory, and Auxiliary Power Cabinet	573,585	559	12,345
B 4732	Two Central Processors, each with 150KB Core Memory; 18 I/O Channels, 2 Disk File Controls and 1 Exchange, File Protect Memory, and Auxiliary Power Cabinet	1,063,655	967	22,935

*Rental prices include equipment maintenance.

Burroughs B 2700, B 3700, & B 4700 EQUIPMENT PRICES

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>Rental (1-year lease)*</u>
B 4700 PROCESSORS AND MAIN STORAGE (continued)				
B 4733	Three Central Processors, each with 150KB Core Memory; 26 I/O Channels, 3 Disk File Controls and 1 Exchange, File Protect Memory, and Auxiliary Power Cabinet	1,578,435	1,375	34,055
B 4734	Four Central Processors, each with 150KB Core Memory; 34 I/O Channels, 4 Disk File Controls and 1 Exchange, File Protect Memory, and Auxiliary Power Cabinet	2,093,210	1,783	45,175
B 4098	Optional Independent Auxiliary Power Cabinet (for File Protect Memory and/or Disk File or Magnetic Tape Exchange units)	12,000	10	250
B 4099	Floating-Point Arithmetic feature	7,200	10	150
B 4301	Additional Type A I/O Channel	3,360	10	70
B 4302	Additional Type B I/O Channel	4,560	10	95
B 4342	Console (standing-level; required with all systems)	1,440	—	30
B 4340	Console Printer Control	6,480	15	135
B 9340	Console Printer and Keyboard	2,640	15	55
B 4341	Operator Display Console Control	10,800	19	225
B 9340-1	Operator Display Console	9,548	33	217
Memory Expansion Modules for B 4700 Systems:				
B 4020-1	Expansion to 200,000 Bytes	43,200	46	970
B 4025-1	Expansion to 250,000 Bytes	100,360	92	1,940
B 4030-1	Expansion to 300,000 Bytes	157,520	154	3,110
B 4035-1	Expansion to 350,000 Bytes	214,680	215	4,280
B 4040-1	Expansion to 400,000 Bytes	271,840	261	5,450
B 4045-1	Expansion to 450,000 Bytes	329,000	307	6,620
B 4050-1	Expansion to 500,000 Bytes	386,160	338	7,790
HEAD-PER-TRACK DISK FILES				
B 9372-12	Disk File; 10 million bytes, 20 msec (includes 1 DFEU)	57,600	200	1,200
B 9374-12	Additional Disk File Increment; 10 million bytes, 20 msec (max. of 4 per B 9372-12)	36,000	103	500
B 9373-3	Disk File; 20 million bytes, 23 msec (includes 1 DFEU)	88,800	210	1,850
B 9374-3	Additional Disk File Increment; 20 million bytes, 23 msec (max. of 4 per B 9373-3)	36,000	128	500
B 9375-4	Memory Bank; 100 million bytes, 40 msec (includes 1 DFEU)	163,360	507	3,150
B 9376-5	Additional Memory Bank Increment; 20 million bytes (price includes 1 DFEU for each 100 million bytes or fraction thereof)	32,670	87	575
B 9371-1	Disk File Electronics Unit (DFEU) for B 9372-12	31,200	82	650
B 9371-6	Additional DFEU for B 9374-3	31,200	82	650
B 9371-11	Additional DFEU for B 9375-4 & 9376-5	31,200	82	650
B 2373-1	Disk File Control (for B 2700)	10,368	12	216
B 3373-1/4373	Disk File Control (for B 3700/4700)	16,080	12	335
B 2375-1	Disk File Combination Control (for B 2700)	12,960	12	270
B 3375-1/4375	Disk File Combination Control (for B 3700/4700)	19,200	12	400
B 2472**	Basic Disk File Exchange, N1 x N2 (up to 4 x 20 with appropriate adapters, below)	10,368	10	216
B 2472-5**	Control Adapter (for N1 side; up to 4 allowed)	2,592	3	54
B 2472-6**	DFEU Adapter (for N2 side; up to 20 allowed)	1,555	1	32
B 2472-7**	Exchange Extension (required for over 10 DFEU's)	7,776	10	162
B 2376**	File Protect Memory (16 40-bit words)	31,200	111	650
B 2376-1**	FPM Disk File Control Adapter (1 required per control; max. of 4)	2,880	9	60
B 2376-2**	FPM Memory Module (16 40-bit words)	3,600	12	75
DISK PACK DRIVES				
B 9484-3	Dual Drives; 121 million bytes total	48,000	123	1,000
B 9484-4	Dual Drives; 242 million bytes total	74,400	191	1,550
B 9485-3	Dual Drives; 121 million bytes total; simultaneous data access	57,600	149	1,200
B 9485-4	Dual Drives; 242 million bytes total; simultaneous data access	84,000	215	1,750
B 9486-3	Dual Drive Increment for B 9484-3 or B 9485-3; 121 million bytes	33,600	103	700
B 9486-4	Dual Drive Increment for B 9484-4 or B 9485-4; 242 million bytes	67,200	169	1,400
B 9486-45	Single Drive Increment for B 9484-4 or B 9485-4; 121 million bytes	38,400	103	800
B 2380-3	Single Control for B 9484-3 (B 2761/2771/2772)	45,600	103	950
B 2380-2	Dual Control for B 9485-3 (B 2761/2771/2772)	98,400	123	2,050
B 2981**	Optional Power Supply for B 2380-2	2,400	10	50
B 3380-1/4380-1	Single Control for B 9484-3 (B 3700/4700)	86,400	103	1,800
B 3380-2/4380-2	Dual Control for B 9485-3 (B 3700/4700)	98,400	123	2,050
B 4383-1	Single Control for B 9484-4 (B 4700 only)	88,800	108	1,850
B 4383-2	Dual Control for B 9485-4 (B 4700 only)	100,800	128	2,100
B 3483-5/4483-5	Control Expansion Adapter (permits up to 16 drives on B 4383-1 or -2)	38,400	106	800
B 9974-1	Disk Pack; certified at 200 tracks/inch for B 9484-3, 9485-3, or 9486-3 drives	575	—	25
B 9974-4	Disk Pack; certified at 200 tracks/inch for B 9484-4, 9485-4, or 9486-4 drives	690	—	30

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Burroughs B 2700, B 3700, & B 4700
EQUIPMENT PRICES

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>Rental (1-year lease)*</u>
MAGNETIC TAPE UNITS				
B 9381-12	2-Station Cluster; 800 bpi, 18KB	25,200	179	525
B 9381-13	3-Station Cluster; 800 bpi, 18KB	26,960	200	570
B 9381-14	4-Station Cluster; 800 bpi, 18KB	32,160	241	680
B 9381-22	2-Station Cluster; 800 bpi, 36KB	33,600	205	700
B 9381-23	3-Station Cluster; 800 bpi, 36KB	43,200	236	900
B 9381-24	4-Station Cluster; 800 bpi, 36KB	52,800	267	1,100
B 9382-12	2-Station Cluster; 1600 bpi, 36KB	29,760	205	620
B 9382-13	3-Station Cluster; 1600 bpi, 36KB	34,320	241	715
B 9382-14	4-Station Cluster; 1600 bpi, 36KB	40,560	277	845
B 9382-22	2-Station Cluster; 1600 bpi, 72KB	34,800	231	725
B 9382-23	3-Station Cluster; 1600 bpi, 72KB	45,600	267	950
B 9382-24	4-Station Cluster; 1600 bpi, 72KB	56,400	302	1,175
B 9383-12	2-Station Cluster; 800/1600 bpi, 18/36KB	30,720	231	640
B 9383-13	3-Station Cluster; 800/1600 bpi, 18/36KB	36,000	272	750
B 9383-14	4-Station Cluster; 800/1600 bpi, 18/36KB	43,200	313	900
B 9383-22	2-Station Cluster; 800/1600 bpi, 36/72KB	36,000	256	750
B 9383-23	3-Station Cluster; 800/1600 bpi, 36/72KB	48,000	297	1,000
B 9383-24	4-Station Cluster; 800/1600 bpi, 36/72KB	60,000	338	1,250
B 9390	Magnetic Tape Unit; 7 tracks, 18/50KC	15,860	149	330
B 9391	Magnetic Tape Unit; 7 tracks, 18/50/72KC	18,000	169	375
B 9392	Magnetic Tape Unit; 9 tracks, 72KB	20,400	169	425
B 9393-1	Magnetic Tape Unit; 9 tracks, 144KB	19,440	149	405
B 9393-3	Magnetic Tape Unit; 9 tracks, 240KB	24,960	159	520
B 9394-1	Magnetic Tape Unit; 7 tracks, 24/66/96KC	18,000	174	375
B 9394-2	Magnetic Tape Unit; 9 tracks, 96KB	20,400	174	425
B 9495-5	Magnetic Tape Unit; 9 tracks, 320KB	29,760	169	620
B 9495-6	Magnetic Tape Unit; 9 tracks, 400KB	34,080	195	710
B 2381-21	Cluster Control; 800 bpi, 18/36KB (B 2700)	19,200	12	400
B 3381-21/4381-11	Cluster Control; 800 bpi, 18/36KB (B 3700/4700)	24,720	12	515
B 2381-22**	Cluster Control; 1600 bpi, 36/72KB	25,200	15	525
B 2381-24**	Dual Cluster Control; 800 bpi, 18/36KB	36,000	31	750
B 2381-25**	Dual Cluster Control; 1600 bpi, 36/72KB	43,200	31	900
B 2381-26**	Dual Cluster Control; 800/1600 bpi, 18/36/72KB	45,600	31	950
B 2391-11**	Tape Control; 7 tracks, 18/50KC	14,160	12	295
B 2391-13**	Tape Control; 7 tracks, 18/50/72KC	15,360	12	320
B 2391-14**	Tape Control; 7 tracks, 24/66/96KC	15,360	15	320
B 2393-11**	Tape Control; 9 tracks, 72KB	16,800	12	350
B 2393-12**	Tape Control; 9 tracks, 144/240KB	12,000	15	250
B 2393-13**	Tape Control; 9 tracks, 96KB	16,800	15	350
B 4395-5	Dual Tape Control; 9 tracks, 320/400KB (for B 4700 only)	54,000	41	1,125
B 2490-10**	Magnetic Tape Unit Exchange; 2 x 10 for B 9390/91/92	12,220	10	260
B 2493-1**	Common Electronics Exchange; 1 x 8, for B 9393 series only	19,920	46	415
B 2493-2**	Common Electronics Exchange; 2 x 8, for B 9393 series only	39,840	92	830
B 4495-1	Basic Electronics/Exchange; 2 x 8, for B 9495 series only	14,400	77	300
B 4495-2	Electronics/Exchange Extension; extends B 4495-1 to 4 x 16	24,000	87	500
E 2680-1**	7-track NRZ Control Adapter for B 2381-21, -24, or -26	2,400	10	50
B 9980	Unit Designate Switch for B 9381 series Tape Clusters	480	1	10
B 9989	7-track NRZ Station Adapter for B 9381 series Tape Clusters	2,400	10	50
OTHER INPUT/OUTPUT UNITS				
B 9110	Card Reader; 200 cpm	8,400	41	175
B 9111	Card Reader; 800 cpm	16,250	85	325
B 9112	Card Reader; 1400 cpm	21,600	129	450
B 9113	Card Reader; 475 cpm	12,480	72	300
B 2110-2	Card Reader Control (B 2700)	2,592	8	54
B 3110-2/4110	Card Reader Control (B 3700/4700)	3,360	8	70
B 9117	Card Counter (for B 9111, 9112 or 9113)	240	—	5
B 9118	Postal Money Order feature (for B 9111, 9112, or 9113)	1,440	5	30
B 9119	40-Column Read Switch (for 9111, 9112, or 9113)	190	—	—
B 9210	Card Punch; 100 cpm	18,425	67	350
B 9212	Card Punch; 150 cpm	20,640	108	430
B 9213	Card Punch; 300 cpm	25,440	138	530
B 2212-2	Card Punch Control (B 2700)	2,592	8	54
B 3212-2/4212	Card Punch Control (B 3700/4700)	3,360	8	70
B 2610	BCL-BCL Code Translator (for B 2212-2)	720	5	15
B 3610	BCL-BCL Code Translator (for B 3212-2 or 4212)	960	5	20
B 9120	Paper Tape Reader; 500-1000 cps	16,000	72	300
B 2120-2	Paper Tape Reader Control (B 2700)	2,592	8	54
B 3120-2/4120	Paper Tape Reader Control (B 3700/4700)	3,360	8	70
B 9926	Input Code Translator	6,960	10	145
B 9220	Paper Tape Punch; 100 cps	15,300	67	260
B 2220-2	Paper Tape Punch Control (B 2700)	2,592	8	54
B 3220-2/4220	Paper Tape Punch Control (B 3700/4700)	3,360	8	70
B 9928	Output Code Translator	6,850	10	130

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**Burroughs B 2700, B 3700, & B 4700
EQUIPMENT PRICES**

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>Rental (1-year lease)*</u>
OTHER INPUT/OUTPUT UNITS (continued)				
B 9240-4	Printer; 475 lpm, 120 positions	19,500	174	209
B 9240-5	Printer; 700 lpm, 120 positions	31,000	179	215
B 9242-1	Printer; 860 lpm, 120 positions	48,575	185	222
B 9242-2	Printer; 725 lpm, 120 positions, OCR A	48,575	185	222
B 9242-3	Printer; 725 lpm, 120 positions, OCR B	48,575	185	222
B 9243-1	Printer; 1100 lpm, 120 positions	54,075	205	246
B 9243-2	Printer; 900 lpm, 120 positions, OCR A	54,075	205	246
B 9243-3	Printer; 900 lpm, 120 positions, OCR B	54,075	205	246
B 9242-11	Printer; 860 lpm, 120 positions	50,400	195	910
B 9242-12	Printer; 725 lpm, 120 positions, OCR A	50,400	195	910
B 9242-13	Printer; 725 lpm, 120 positions, OCR B	50,400	195	910
B 9243-11	Printer; 1100 lpm, 120 positions	55,900	217	1,015
B 9243-12	Printer; 900 lpm, 120 positions, OCR A	55,900	217	1,015
B 9243-13	Printer; 900 lpm, 120 positions, OCR B	55,900	217	1,015
B 2240-1	Printer Control (for B 2700, with B 9943)	3,760	8	80
B 2242-1	Printer Control (for B 2700, without B 9943)	3,760	12	80
B 3240-1/4240	Printer Control (for B 3700/4700, with B 9943)	4,800	10	100
B 3242-1/4242	Printer Control (for B 3700/4700, without B 9943)	4,800	10	100
B 9940	High-Speed Slew (for B 9242/9243 Printers)	3,000	21	60
B 9941	12 Additional Print Positions (for all printers)	2,000	10	40
B 9943	Printer Memory (for B 9242/9243 Printers)	4,800	10	100
B 9244-1	Master Tape Lister; 1565 lpm	67,500	333	1,350
B 9244-2	Slave Tape Lister; 1565 lpm	32,500	205	650
B 2244-1	Lister Control	3,600	8	75
B 3244-1/4244	Lister Control	4,800	10	100
B 9130	MICR Reader-Sorter; 1565 dpm, 13 pockets	90,720	513	1,890
B 9131	MICR Reader-Sorter; 1565 dpm, 13 pockets	91,200	513	1,900
B 9131-1	MICR Reader-Sorter; 1000 dpm, 13 pockets	57,600	461	1,200
B 9132	MICR Reader-Sorter; 1565 dpm, 16 pockets	105,600	630	2,200
B 9134-1	MICR/OCR Reader-Sorter; 1625 dpm, 4 pockets	49,200	333	1,025
B 2130-6	MICR Reader-Sorter Control (for B 9130, 9131, 9131-1, & 9132)	4,938	15	105
B 3130-6/4130	MICR Reader-Sorter Control (for B 9130, 9131, 9131-1, & 9132)	6,480	15	135
B 9932	Endorser (for B 9131, 9131-1, & 9132)	9,000	51	200
B 9933	Extended Sort Control (for B 9130, 9131, & 9131-1)	2,400	15	50
B 9937	Validity Checking (for B 9130, 9131, 9131-1, & 9132)	450	-	10
B 2130-7	Reader-Sorter Control (for B 9134-1; MICR only)	4,800	15	100
B 2130-8	Reader-Sorter Control (for B 9134-1; MICR/OCR)	7,200	15	150
B3130-7/4130-1	Reader-Sorter Control (for B 9134-1; MICR only)	6,240	15	130
B 3130-8/4130-2	Reader-Sorter Control (for B 9134-1; MICR/OCR)	9,360	15	195
B 9932-1	Endorser (1625 dpm, for B 9134-1)	9,000	51	200
B 9935-1	Expansion Feature (for over 16 pockets on B 9134-1)	4,800	10	100
B 9935-2	Four-Pocket Module (pockets 5-16 on B 9134-1)	14,400	36	300
B 9935-3	Four-Pocket Module (pockets 17-32 on B 9134-1)	14,400	36	300
B 9938-1	Multi-Track E-13B Feature (for B 9134-1)	18,000	56	375
B 9938-4	Numeric OCR A Feature (for B 9134-1)	31,200	100	650
B 9938-5	Numeric OCR B Feature (for B 9134-1)	31,200	100	650
B 9938-9	Dual Read Option (for B 9134-1)	7,200	26	150
B 9410	Peripheral Switching Unit (basic switch)	7,200	15	150
B 9410-1	Switch Relay Module	1,440	3	30
DATA COMMUNICATIONS CONTROLS				
B 2351-2	Single-Line Control (for B 2700)	6,110	14	130
B 3351-2/4351	Single-Line Control (for B 3700/4700)	8,160	14	170
B 2352**	Data Communications Processor Control	12,240	30	255
B 2353-1**	Basic Multi-Line Control	23,040	31	480
B 2354-1**	8-Channel Extension for Multi-Line Control	7,200	10	150
Communications Line Adapters for B 2700 Systems:				
B 2651-1	For Typewriter Inquiry Station	1,440	5	31
B 2652-3	For TXW/Remote Typewriter	1,440	5	31
B 2652-4	For TWX/Remote Typewriter with ADO	2,160	10	47
B 2653-5	For B 2500/3500/2700/3700/4700	2,400	5	52
B 2653-6	For B 2500/3500/2700/3700/4700 with ADO	3,290	10	70
B 2654-3	For UNIVAC DCT 2000	4,230	5	90
B 2654-4	For UNIVAC DCT 2000 with ADO	4,935	10	105
B 2655-3	For IBM 1050	3,055	5	65
B 2655-4	For IBM 1050 with ADO	3,760	10	80
B 2656-2	For IBM 1030	2,400	5	52
B 2657-1	For Teletype Model 35 or 8A1 Selective Call Service	1,440	5	31
B 2662-1	For Teletype Model 28 on 83B3 Service	1,920	5	40
B 2663-1	Audio Dual Line Adapter (for B 2354-1)	5,170	15	110
B 2667-1	Burroughs Standard Adapter—Direct Connect	2,115	5	45
B 2667-2	For TU 100—Direct Control	1,440	5	30
B 2667-5	Burroughs Standard Adapter—Asynchronous	2,400	5	52
B 2667-6	For B 606 and/or TC 700 (with MLC only)	2,585	5	55

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**Burroughs B 2700, B 3700, & B 4700
EQUIPMENT PRICES**

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>Rental (1-year lease)*</u>
DATA COMMUNICATIONS CONTROLS (continued)				
Communications Line Adapters for B 2700 Systems (continued)				
B 2667-7	For TU 100—Modem Connect	1,680	5	35
B 2667-10	Burroughs Standard Adapter—Synchronous	3,055	5	65
B 2667-15	Automatic Dial-Out for B 2667-5 and -10	720	4	15
B 2667-16	Speed Adapter, for up to 1800 bps on B 2667-1 and -5	720	5	15
B 2667-17	Speed Adapter, for up to 2400 bps on B 2667-1	1,440	5	30
B 2667-18	Speed Adapter, for up to 4800 bps on B 2667-1 and -10	1,920	5	40
B 2667-19	Speed Adapter, for up to 9600 bps on B 2667-1	2,400	5	50
Communications Line Adapters for B 3700/4700 Systems:				
B 3651-1/4651	For Typewriter Inquiry Station	1,920	5	40
B 3652-3/4652-1	For TWX/Remote Typewriter	1,920	5	40
B 3652-4/4652-2	For TWX/Remote Typewriter with ADO	2,640	10	55
B 3653-5/4653-1	For B 2500/3500/2700/3700/4700	3,264	10	68
B 3653-6/4653-2	For B 2500/3500/2700/3700/4700 with ADO	3,840	10	80
B 3654-3	For UNIVAC DCT 2000	4,230	5	90
B 3654-4	For UNIVAC DCT 2000 with ADO	4,935	10	105
B 3655-3	For IBM 1050	3,055	5	65
B 3655-4	For IBM 1050 with ADO	3,760	10	80
B 3656-2/4656-1	For IBM 1030	3,360	10	70
B 3657-1/4657	For Teletype Model 35 on 8A1 Service	1,920	5	40
B 3662-1/4662	For Teletype Model 28 on 83B3 Service	2,640	5	55
B 3663-1/4663	Audio Dual Line Adapter	4,800	10	109
B 3667-1/4665-1	Burroughs Standard Adapter—Direct Connect	2,640	5	55
B 3667-2/4665-2	For TU 100—Direct Connect	1,440	5	30
B 3667-5/4665-5	Burroughs Standard Adapter—Asynchronous	3,264	7	68
B 3667-6/4665-6	For B 606 and/or TC 700 (with MLC only)	2,400	5	52
B 3667-7/4665-7	For TU 100—Modem Connect	1,680	7	35
B 3667-10/4665-10	Burroughs Standard Adapter—Synchronous	3,840	7	80
B 3667-15/4665-15	Automatic Dial-Out for B 3667-5, 3667-10, 4665-5, and 4665-10	720	1	15
B 3667-16/4665-16	Speed Adapter, for up to 1800 bps on B-3667-1, 3667-5, 4665-1, and 4665-5	720	1	15
B 3667-17/4665-17	Speed Adapter, for up to 2400 bps on B 3667-1 and 4665-1	1,440	1	30
B 3667-18/4665-18	Speed Adapter, for up to 4800 bps on B 3667-1, 3667-10, 4665-1, and 4665-10	1,920	3	40
B 3667-19/4665-19	Speed Adapter, for up to 9600 bps on B 3667-1 and 4665-1	2,400	3	50
B 9350	Typewriter Inquiry Station	2,640	12	55
B 2355-1**	Voice Response Generator	37,200	32	795
B 9955-1	Audio Recording (Special)	2,575	—	—
B 9955-2	Audio Recording (Library)	750	—	—
DATA COMMUNICATIONS PROCESSOR (DCP)				
B 2350**	Basic DCP System, including 16,384-byte core memory, console printer & keyboard, and 16-line Multi-Line Control	57,600	120	1,315
DCP Memory Modules:				
B 2320**	Expansion to 20,480 Bytes	6,000	12	135
B 2324**	Expansion to 24,576 Bytes	12,000	25	275
B 2328**	Expansion to 28,672 Bytes	16,800	35	385
B 2332**	Expansion to 32,768 Bytes	21,600	45	495
B 2310**	Card Reader Control for DCP	1,680	4	35
B 9114-1	Card Reader; 200 cpm	4,280	44	105
B 2330-1**	DCP-to-Processor Adapter; 50,000 bps	9,600	25	200
B 2330-2**	Second DCP-to-Processor Adapter; 50,000 bps	9,600	25	200
DCP Multi-Line Control Extensions and Adapters:				
B 2335**	16-Line Extension (maximum of 3)	9,120	21	210
B 2335-1**	Adapter for 4-Bit Character Interface	3,490	8	80
B 2336**	Model 28/83B3 (8 Adapters)	2,880	18	66
B 2336-1**	Direct Connect; up to 9600 bps (4 Adapters)	1,200	4	28
B 2336-5**	Data Set Connect; asynchronous, 103 or 202 type at up to 1200 bps, or synchronous, 201 type at up to 4800 bps (4 Adapters)	1,920	6	44
B 2338**	801 ADO—16-line multiplexor	6,720	5	154
B 2338-1**	801 ADO—16-line multiplexor extension	3,840	7	88
B 2338-15**	801 ADO Adapters (4 Adapters)	2,880	10	66

* Rental prices include equipment maintenance.

** These units are for B 2700 systems; corresponding units for B 3700 and B 4700 systems are similarly priced, with "3" or "4" generally replacing "2" as first digit of model number.

Burroughs B 2700, B 3700, & B 4700

SOFTWARE PRICES

		UNLIMITED-TIME PLAN			LIMITED-TIME PLANS	
		Single Payment	12 Monthly Payments	Annual Maint. Charge	Monthly Fee (3-Year-Plan)	Monthly Fee (5-Year-Plan)
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	9,000	825	200	200	192
LCB	Large Commercial Bank Item Processing System I	13,000	1,200	300	300	288
LCS	Large Commercial Bank Item Processing System II	18,500	1,700	450	450	432
FRB	Federal Reserve Bank Item Processing System I	13,000	1,200	300	300	288
FRS	Federal Reserve Bank Item Processing System II	18,500	1,700	450	450	432
AIC	IPS Automatic Item Correction	1,000	95	25	25	24
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	0	0	0	0	0
PCR	Requirements Planning	0	0	0	0	0
PCI	Production Control System Inventory	0	0	0	0	0
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	0	0	0	0	0
SSI	School Scheduling	5,000	460	150	150	144
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
PROGRAM PRODUCT DEVELOPMENT AIDS						
FOS	Disk FORTE Standard	0	0	0	0	0
REP	Reporter	3,000	275	75	75	72
NDL	Network Definition Language	4,000	370	130	130	125