

Burroughs B 800 Series

MANAGEMENT SUMMARY

Burroughs 800 family of computers extends from the B 80 and B 800 series minicomputers to the B 6800 and B 7800 larger-scale computers. One of the main goals in the Burroughs product line is software compatibility. This compatibility provides a relatively easy route for upgrading existing installations, as well as allowing Burroughs to take advantage of existing application software throughout the product line.

The B 800 series of business computers is a good example. There are two distinct versions: the B 801 is a foreground/background processing system that functions just like the previous B 700 batch-oriented computers, while the B 810, B 820, and B 830 models offer true multiprogramming, disk packs, fixed-disk storage, and other improvements over the B 700 Series. The only significant hardware difference between the two B 800 versions is the minimum allowable memory size: a B 801 running under the SCP system software requires a minimum of 32K bytes, while a multiprogramming B 810, B 820, or B 830 running under the CMS system software requires a minimum of 80K bytes of MOS memory. The only software differences are that the B 801 is loaded with the SCP operating system while the B 810, B 820, or B 830 is loaded with CMS, and that the COBOL and RPG compilers are slightly different, requiring a "filtering" program and recompilation. Since the operating systems are sold separately, users can customize their own combinations of hardware and operating systems to best execute their existing or planned application programs.

The B 800 line of small-scale computers currently consists of 14 packaged system models used for business applications, data communications, and distributed data processing.

MAIN MEMORY: 32K to 150K bytes.
DISK CAPACITY: 4.6 to 130.4 megabytes.
WORKSTATIONS: Up to ten.
PRINTERS: 160 to 750-lpm.
OTHER I/O: Magnetic tape, punched card equipment, reader/sorters.

CHARACTERISTICS

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

Burroughs is considered to be one of the strongest competitors in the data processing marketplace, with a broad line of computer equipment spanning the range from small, entry-level systems to very large, multi-user, multiprocessor systems. In addition to data processing equipment, Burroughs also markets magnetic media; business forms and supplies; document counting, encoding, signing, protecting, and disbursing equipment; programmable and nonprogrammable desktop calculators; specialized banking equipment; word processing equipment; facsimile devices; and other related products. Burroughs is international in scope and employs some 50,000 people in more than 120 countries around the globe.

MODELS: Fourteen packaged system models.

DATE ANNOUNCED: March 1978 (B 867 and B 877); January 1977 (B 801, B 811, B 812, B 821, and B 828);



This large configuration of the Burroughs B 820 system includes, in the foreground, two TD 830 CRT's at left, a Direct Data Entry Station (DDES) at right, and an AE 500 Audit Entry Station with two Super Mini-Disk drives in the center. From left to right in the background are the DDES console, a double-width B 820 processor, two disk pack drive cabinets, and two line printers.

REFERENCE EDITION. This is a mature product line, and no significant further developments are anticipated. Because of its importance, coverage is being continued, but no future update is planned.

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CHARACTERISTICS OF THE B 800 PROCESSORS

MODEL	B 801	B 810	B 820	B 830	B 867-1/-2	B 877
CENTRAL PROCESSORS						
Word size, bits	64	64	64	16	16	16
Clock speed, MHz	1	1	2	2	1/2	2
Maximum number of I/O controls	7	7	7	11	5	9
MAIN MEMORY						
Type	MOS	MOS	MOS	MOS	MOS	MOS
Minimum capacity, bytes	32,768	81,920	81,920	81,920	49,152	49,152
Maximum capacity, bytes	81,920	131,072	131,072	147,456	116,736	150,528
Cycle time, microseconds	1	1	1	1	1	1
Access time, microseconds	0.5	0.5	0.5	0.5	0.5	0.5
Bits fetched per cycle	16	16	16	16	16	16
Increment, bytes	8,192	8,192	8,192	8,192	8,192	8,192
Parity checking	Standard	Standard	Standard	Standard	Standard	Standard
CONTROL MEMORY						
Type	MOS	MOS/bipolar	MOS/bipolar	MOS/bipolar	MOS/bipolar	MOS/bipolar
Size, bytes	16,384	49,152	49,152	49,152	49,152	49,152
Access time, microseconds	0.5	0.5 (MOS)/0.25				
Cycle time, microseconds	1	1 (MOS)/0.5				
Bits fetched per cycle	16	16	16	16	16	16

➤ Typical B 800 peripheral devices include printers ranging to 750-lpm, TD 730 and TD 830 display terminals, DDES data entry stations, card readers, tape drives, and reader/sorters. Mass storage comes in various forms: disk cartridge drives ranging to 9.2 million bytes each, fixed-disk drives ranging to 37.6 million bytes each, disk pack drives ranging to 130.4 million bytes each, and either industry-compatible floppy disk drives with 243K bytes or the Burroughs Super Mini Disk drives with a capacity of 1 million bytes each.

Typical configurations of terminals might include a maximum of four DDE stations, two DDE stations and three to six TD terminals, or one DDE station and a string of TD terminals where the limits of the "string" are determined by the activity of the terminals, the line speeds selected, and the desired line response time. If no DDE stations are used, from 4 to 10 TD terminals represent a practical configuration.

A unique feature of the B 800 family is the 10-megahertz Data Communications Pre-Processor (DCPP), which handles all of the polling, error/retry, and stripping tasks that would normally be done by the main CPU. Completed messages are taken from, and placed into, queues in main memory without placing a burden on the main system processor, thus reducing the main processor's data communications burdens by as much as 40 to 60 percent. Also, the DCPP has access to the direct memory access channel (DMA), so that the DCPP can share memory cycles with the main system processor and the disk I/O control. The DMA prohibits any one of them from preempting memory to the detriment of the other two. The DCPP also controls the line characteristics, which are fully programmable for each line through the Network Definition Language (NDL).

➤ February 1978 (B 815, B 816, B 817, B 825, B 826, B 827, and B 835).

DATA FORMATS

BASIC UNIT: 64-bit word in all B 800's except the B 86X and 87X Series, where the word length is 16 bits. Each word in memory may be thought of as eight 8-bit characters or hexadecimal bytes, 16 4-bit decimal digits or hexadecimal digits, one 4-bit sign plus 15 4-bit decimal digits, or two 32-bit halfwords each containing four 8-bit characters or eight 4-bit digits. Memory capacities are usually expressed in 8-bit bytes.

INSTRUCTIONS: The B 800 is an interpreter-based system using variable micrologic to produce a machine-level language which Burroughs calls S-Language. The user does not have an assembler-type language available to him. The S-Language code requires an interpreter for further breakdown so that it can be executed. S-Language consists of instructions which are 2, 3, 4, or 5 bytes long. In all cases the operation code is one byte in length and resides in the right-most byte of the instruction. Instructions are stored and read from right to left. There are 216 S-Language instructions defined on machines such as the B 800. A maximum of 256 such instructions can be defined. A single instruction can address from 4 bits to 64 bits. Up to 16 bits can be transferred in parallel between main memory and the processor.

INTERNAL CODE: ASCII; other media codes, such as EBCDIC, can be translated.

MAIN STORAGE

TYPE: MOS RAM and/or bipolar RAM. MOS refresh is not required. For specific B 800 models, refer to the table on page M11-112-452. On B 820 models, 16K bytes of bipolar memory are standard.

CYCLE TIME: Refer to the table on page M11-112-452.

CAPACITY: Refer to the table on page M11-112-452.

CHECKING: One parity bit is associated with each 16 bits of memory. Correct parity is generated when writing and checked when reading. See the table on page M11-112-452 for a more definitive breakdown of models.

STORAGE PROTECTION: Main storage write operations by user programs are permitted only within the limits de-

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PERIPHERALS/TERMINALS TABLE

DEVICE	DESCRIPTION AND SPEED	MANUFACTURER
MAGNETIC TAPE EQUIPMENT		
B 9491-2	Reel-to-Reel; 9-track, 800 bpi, 7-inch reels, 12.5 ips, 50 ips rewind, read-after-write, NRZI; 10 KBS	Burroughs
B 9491-4	Reel-to-Reel; 9-track, 1600 bpi, 10.5-inch reels, 25 ips, phase encoded; 40 KBS	Burroughs
B 9490-25	Cassette; 2-track, one track for clocking, 800 bpi, 282 feet, 10 ips, 60 ips rewind, read-after-write, NRZI, bit-serial encoding using 8-bit ASCII code; 3 KBS	Burroughs
PRINTERS (2 allowed)		
B 9249-2	Chain; 132 positions, 48- (64 or 96 optional) character set, 3- to 17-inch paper 8.3-ips slew rate, 10 characters per inch, 2-channel VFU (12 optional); 160 lpm	Burroughs
B 9249-3	Chain; 132 positions, 48- (64 or 96 optional) character set, 3- to 17-inch paper, 8.3-ips slew rate, 10 characters per inch, 2-channel VFU (12 optional); 250 lpm	Burroughs
B 9249-4	Chain; 132 positions, 48- (64 or 96 optional) character set, 3- to 17-inch paper, 8.3-ips slew rate, 10 characters per inch, 2-channel VFU (12 optional); 350 lpm	Burroughs
B 9247-13	Train; 132 positions; 48- (16, 64 or 96 optional) EBCDIC or ASCII character set, 4- to 20-inch paper, 20-ips slew rate, 12-channel VFU; 750 lpm (for B 820 CMS only)	Burroughs
PUNCHED CARD EQUIPMENT		
B 9115	Reader; 80-column, 51-column optional; 1000-card input stacker, 1000-card output hopper; 300 cpm	Burroughs
B 9116	Reader; 80-column, 51-column optional, 1000-card input hopper, 1000-card output stacker; 600 cpm	Burroughs
B 9119-1	Reader; 96-column, 600-card input hopper, 600-card output stacker, 300 cpm	Burroughs
B 9418-2	Reader/Punch/Data Recorder; 80-column, 600-card primary & 400-card secondary input hoppers, three 80-character buffers, two 400-card output stackers; 200/45/45 cpm	Burroughs
B 9419-2	Reader/Punch/Data Recorder; 96-column, 600-card primary & 400 card secondary input hoppers, three 96-character buffers, two 400-card output stackers; 300/60/60 cpm	Burroughs
B 9419-6	Reader/Punch/Data Recorder/Sorter; 96-column, 600-card primary & 400-card secondary input hoppers, three 96-character buffers, six 400-card output stackers; 300/60/60 cpm	Burroughs
READER/SORTERS		
B 9135-2, 3	Reader/Sorter; processes documents of intermixed weight, width, & length; 17.5-inch deep input hopper, 8 (12 in the 9135-3) 3.5-inch deep output pockets; 4-pocket increments up to 32 pockets may be added; MICR E-13B font character recognition system; 900 dpm	Burroughs

➤ The CPU clock speed is controlled at the time of warm-starting the system. Thus, a B 800 can be run under SCP at 1 megahertz in the morning, and then under CMS at 2 megahertz in the afternoon, simply by loading a different operating system.

The B 800 is the first small disk system that Burroughs has released that doesn't require a printing console for recording the log. With the B 810, B 820, and B 830 models, prospective users have a choice of either a 120-cps printing console, which resembles the console found on the B 700 computer, or a B 9347-2 Direct Data Entry Station (DDES). Messages from the operating system are displayed on the DDES, and then saved in a disk file for later use and for printing a system log. The consoles can be used in conjunction with application software for data entry; the printing console can be used as a second or third printer in a multiprogramming environment. ➤

➤ **fined by the concatenation of the memory address register and one of the base registers.**

RESERVED STORAGE: A variable portion is reserved for microinstructions. This portion of memory is called the Micro Program Memory (MPM) and consists of three elements. The resident area contains certain registers used by interpreter-generated programs, the loader, the I/O manager, basic micro-subroutines, common housekeeping subroutines, instruction fetch and decode routines, disk and console controller routines, and common code. The overlap area is used for such functions as trace operations or residence for search, keyboard, or console print operators. Finally, the variable area is used for peripheral device controllers, disk address calculation, numeric editing in both COBOL and RPG, and some of the more complex instructions.

CENTRAL PROCESSORS

GENERAL: The B 800 processors feature dynamically variable microprogrammed logic, in which the processor has a minimal predefined structure. Under this design, a fundamental systems control program resides in a high-speed bipolar read-only-memory (ROM) called the "nanomemory." ➤

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PERIPHERALS/TERMINALS TABLE (Continued)

DEVICE	DESCRIPTION AND SPEED	MANUFACTURER
TERMINALS		
TD 700	Self-Scan display/keyboard; 256 characters, 8 lines by 32 characters, 64 ASCII character set, 5 x 7 dot matrix, red phosphor illumination, detachable typewriter-style keyboard; 150 to 1800 bps asynchronous, 2400 to 4800 bps synchronous, 9600 bps via two-wire direct interface (TDI), 64,000 bps via Burroughs direct interface (BDI)	Burroughs
TD 701/TD 73X	Self-scan display/keyboard; 256 or 480 characters, 8 lines by 32 or 12 lines by 40 characters, 128 ASCII character set, 5 x 7 dot matrix, red phosphor illumination, extended memory options, various keyboards & peripherals; same data transfer rates as TD 700	Burroughs
TD 801/TD 802	CRT display/keyboard; 960 or 1920 characters, 12 lines by 80 or 24 lines by 80 characters, 64 ASCII character set, 5 x 7 dot matrix, extended memory options, detachable keyboard; 75 to 1800 bps asynchronous, 2400 or 4800 bps synchronous, 9600 bps via TDI, 64,000 bps via BDI	Burroughs
TD 820	CRT display/keyboard; 960 or 1920 characters, 12 lines by 80 or 24 lines by 80 characters, 96 ASCII character set, 5 x 7 dot matrix, detachable keyboard, extended memory options, various peripherals including cassette drive, floppy disk, line printer, and magnetic card reader, and features such as negative, reverse, blink and blank video; same data transfer rates as TD 801/TD 802	Burroughs
TD 83X	CRT display/keyboard; 1920 characters plus 80-character system status line, 24 lines (plus system line) by 80 characters, 128-ASCII character set, 5 x 7 dot matrix, various keyboards & peripherals including serial line printers, cassette drive, magnetic badge readers; and features such as negative, reverse, blink and blank video; same data transfer rates as TD 801/TD 802	Burroughs
TC 4001	Printing terminal; serial impact, 7 x 7 dot matrix, 150 positions, 64-ASCII character set, 3- to 16.75-inch paper, 10 characters per inch, forms compose feature with 5-ips slew rate optional, up to 1536-character buffer, 6 lines per inch; 60 cps; transmission of 75 to 1800 bps asynchronous, 2400 to 9600 bps synchronous, 9600 bps via TDI or BDI	Burroughs
TC 5110-5115	Intelligent terminals; built-in keyboard, same processor as B 80, same printer as TC 4001, one or two 9490 cassette drives or 9481 ICMD floppy disk drives, 256-character Self-Scan display optional; same data transfer rates as TC 4001	Burroughs

➤ A minimal B 801 system consisting of a 1-megahertz processor with 32K bytes of MOS main memory, one 120-cps printing console, and one 4.6-million-byte dual disk cartridge drive can be purchased for \$35,045. The SCP operating system is priced separately at \$1,500, while the utilities are also priced separately at \$540.

A B 800 fixed-disk system with a 2-megahertz processor, 112K bytes of MOS memory, 16K bytes of bipolar memory, DDE console and control, 18.8M bytes of fixed disk storage and control, 1.0M-byte Burroughs Super Mini Disk Drive, 350-lpm printer and data communications pre-processor sells for \$48,900. The software is separately priced at \$2,500, while the utility package costs \$540.

COMMUNICATIONS PROCESSORS

Burroughs also offers three communications-oriented B 800 series processors that boast improvements over the previous B 776 models. The new processors are compatible with most existing Burroughs mainframes and terminal systems. The B 877 is twice as fast as the B 776, and can be configured with 2 data communications processors for a total of up to 32 data communications lines; the B 867-1 ➤

➤ A second "shared" main memory is provided for use by both the applications program being executed and a microprogram system called the "Interpreter." The Interpreter consists of the detailed logic required to convert or interpret the object-language version of an application program into the basic, Boolean-type manipulations or I/O operations that are directly executable by the B 800 processor.

The amount of shared memory used by the Interpreter is variable, with only those specific portions of the Interpreter present in the system during program execution that are required by a given program. This capability is referred to as Dynamic Interpreter Configurability. It is also known as run-time, or simply late, "binding." It results in a dynamic boundary line in the shared memory between the Interpreter and the application program that permits reducing of system software memory overhead to a minimum.

Each object program has a directory or catalog appended to it that enumerates the specific instruction types, buffer requirements, and I/O devices used by that program. When the application program is loaded into the system, the directory or catalog is matched against the complete repertoire of functions supported by the full Interpreter, and unused functions are deleted.

The Interpreter itself is designed to facilitate execution of the S-Language or machine-level language for a virtual machine best suited to a particular high-level language. For the B 800 systems, COBOL and RPG are both supported by the same Interpreter. The logical structure of a B 800 system, including instruction repertoire, I/O configuration, and buffer requirements, is "bound" at run time so that the B 800 system looks as if it were custom-developed to execute a specific program. ➤

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B 800 FAMILY MASS STORAGE DEVICES

Model	Description	Capacity/Drive (Bytes)	Avg. Access Time (Milliseconds)	Allowable Systems
A 9489-5, -17	Industry-compatible floppy disk drive	243,000	343	All
A 9489-1	Burroughs Super Mini Disk—Inbuilt	1 million	266	B 810, B 820, B 830 (CMS)
A 9489-11	Burroughs Super Mini Disk—Free Standing	1 million	266	B 810, B 820, B 830 (CMS)
B 9480-22	Dual disk cartridge drive	4.6 million	145	All
B 9481-12	Dual disk cartridge drive	9.2 million	100	All
B 9493-9	Fixed disk drive	9.4 million	55	B 810, B 820, B 830 (CMS)
B 9493-18	Fixed disk drive	18.8 million	55	B 810, B 820, B 830 (CMS)
B 9493-28	Fixed disk drive	28.2 million	55	B 810, B 820, B 830 (CMS)
B 9493-37	Fixed disk drive	37.6 million	55	B 810, B 820, B 830 (CMS)
B 9387-11	Disk pack drive	65.2 million	33	B 820, B 830 (CMS)
B 9387-12	Disk pack drive	130.4 million	33	B 820, B 830 (CMS)
B 9484-5	Disk pack drive increment	130.4 million	33	B 820, B 830 (CMS)

➤ and -2 are limited to a single DCP with a maximum of 7 data communications lines.

The new communications processors are object-code-compatible with existing B 776's and utilize the same MCP operating system as the B 810, B 820, and B 830 computers. Two cartridge disk drives provide a choice of 4.6 or 9.2 million bytes per cabinet; users can also choose either 65.2- or 130.4-million-byte disk pack drives or the 9.4-, 18.8-, 28.2-, or 37.6-million-byte fixed-disk drives. Standard Burroughs peripherals usable with the new processors include CRT consoles, line printers ranging to 750 lpm, reel-to-reel magnetic tape drives, tape cassette units, 80-column card readers, and either industry-compatible floppy disk drives or the Burroughs Super Mini Disk drive with a capacity of 1 million bytes.

SOFTWARE

Two operating systems are available for the B 800 systems.

SCP is a foreground/background operating system that provides essentially the same functions as the SCP running on a B 700. Under this operating system, a limited form of multiprogramming is allowed through the ability to run one batch job and up to four DDES units with their associated Audit Entry Language programs. An interrupt/resume or checkpoint/restart function, which rolls out the present status of the machine and its processing onto disk to allow a high-priority job to be loaded into the system, is also utilized on the B 800 under SCP. Following completion of the high-priority run, the first program can be restored and processed. The interrupt can be initiated either by the operator or by a request from a TD 730 or TD 830 terminal, where an interrupt might take two or three seconds. If the DDES units are utilized in an SCP environment, the memory size must be at least 48K bytes.

SCP automatically maintains a system log on the console of the B 800. The size of the interpreter is about 16K bytes, leaving an additional 16K bytes for application ➤

➤ Each S-Language instruction is implemented by a string of microinstructions which interpretively execute the functions specified by the S-instruction. Because the S-instructions are software-defined by the microprograms, the functions they specify can be quite complex. In most cases, S-instructions specify an operation to be performed, one or more operand addresses, data field lengths, and units of data. Because the S-Language and its Interpreter are oriented toward the characteristics of each programming language, Burroughs states that on the average only about one-tenth as many S-instructions need to be executed to perform a given function as in typical machine-level computer programs.

User memory consists of variable buffers A, B, D, and E; a scratch-pad memory consisting of a maximum of 256 64-bit words; and an area for user program residence. The B 800's also feature an automatic warm start capability through the use of a ROM chip.

Please refer to the price list at the end of this report for packaged system configurations. SCP configurations with 32K bytes of memory and CMS configurations with 80K bytes of memory include enough memory to house the operating system and still leave about 16K bytes for user software.

A unique feature of the B 800 family is the 10-MHz Data Communications Pre-Processor (DCPP), which handles all of the polling, error/retry, and stripping tasks that would normally be done by the main CPU. Completed messages are taken from, and placed into, queues in main memory without placing a burden on the main CPU, thus reducing the main processor's data communications burden. Also, the DCPP has access to the Direct Memory Access channel (DMA), so that the DCPP can share memory cycles with the main processor and the disk I/O control. The DMA prohibits any one of them from preempting memory to the detriment of the other two. The DCPP also controls the line characteristics, which are fully programmable for each line through the Network Definition Language (NDL). The clock speed of the main CPU is controlled by the operating system that is warm-started into the system. By changing operating systems (SCP to CMS), the CPU will automatically revert from 1 MHz to 2 MHz.

B 800's can have up to two line printers, with a printing console acting as back-up or as a third line printer.

COMMUNICATIONS PROCESSORS: The B 860 and B 870 communications processors are free-standing versions of the company's B 800 general-purpose data processing systems specifically tailored for data communications environments. These systems operate under the Burroughs Computer Management System (CMS) introduced for the ➤

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▷ software on minimal systems. However, the interpreter size can vary depending upon the peripheral requirements of the programs. The system's Dynamic Interpreter Configurator will configure only the microcode that is required to execute each particular application program.

SCP also contains trace and dump facilities, as well as operational recovery procedures. Code segmentation of user programs enables the use of overlays, with resultant efficient utilization of memory.

The Report Creation System consists of three programs designed to retrieve and display information in a report format. Up to five variables may be loaded at run time. Allowable operations include arithmetic, record selection, comparison testing, and listing.

B 810, B 820, and B 830 models utilize the true multiprogramming CMS software that incorporates a Master Control Program (MCP), which is similar to the MCP used on the Burroughs B 1800 and B 80 computers. Under the MCP, jobs are scheduled according to memory priority, disk priority, and segment sizes. This operating system was designed to simplify the operation and control of the system and to increase productivity by automatically handling many functions that would ordinarily be handled by an operator or programmer.

Operator communication with the MCP is provided through a system console that provides messages pertaining to beginning of job, end of job, errors, file requirements, status of the job mix, missing data, or messages generated by user software. This console could be either a B 9343-120 printing console or the B 9347-2 DDES data entry station. When utilizing the DDES, system messages are displayed and stored for subsequent printing on the line printer. The operator can refer back to system messages at any time, and the system enforces the saving of all messages.

The MCP in the B 800 allows multiprogramming to take advantage of all available resources. It may not be unusual to have three or more programs running on a B 800, but memory requirements and disk storage capacity will normally determine the practical extent of the multiprogramming capabilities. The B 800 MCP also supports virtual memory. COBOL and RPG programs are automatically segmented by the compiler, and only those segments that are necessary are brought into the processor. This allows the B 800 to process a mix of independent programs, any or all of which may be larger than main memory.

Two languages, COBOL and RPG, are available on the B 800 systems for general business purposes. The B 800 Series has its own on-board compiler for each, but programs may also be compiled on a larger Burroughs computer such as a B 1800.

▶ B 800 and B 1800 general-purpose systems. CMS includes the Generalized Message Control System, a store and forward message switching program, a Network Definition Language (NDL), a Message Processing Language (MPL), a COBOL compiler, an RPG compiler, and a remote job entry module. A full range of peripheral devices is available, including line printers up to 750-lpm, cassette tape drives, IBM-compatible and Burroughs high-density floppy disk drives, 9-track tape drives, 80-column card readers, cartridge disk drives, fixed-disk drives, and disk pack drives. A CRT display can be used as the console.

Three models have been introduced to date: the B 877, B 867-2, and B 867-1. The models are differentiated by the type and size of control memory, the permissible amount of main memory, the processor speed, the number of communications lines interfaced, and the permissible number of peripheral subsystems.

In all communications models, access to memory is controlled by a Direct Memory Access Channel (DMA) that allocates memory cycles among the main system processor, the disk I/O control, and one or two data communications processors (DCP's). The DCP's are microprocessors.

The largest model, the B 877, can have up to 32K bytes of MOS control memory, 16K bytes of bipolar control memory, and up to 96K bytes of user memory. The B 877 can include up to ten I/O controllers and one or two DCP's, each of which can handle up to 16 communications lines.

The smallest model, the B 867-1, utilizes up to 48K bytes of MOS control memory, up to 64K bytes of user memory, up to 6 I/O controllers, and 1 DCP, which can accommodate up to 7 communications lines.

The in-between model, the B 867-2, utilizes the same processor as the B 877, which is twice as fast internally as the B 867-1 processor, but shares the peripheral and communications line configuration limitations of the B 867-1.

The DCP bit-oriented microprocessor includes a memory of 8192 12-bit words, which is used to store the Network Definition Language interpreter. The main system processor is not interrupted, except for cycle sharing, until a complete message is assembled in main memory.

Communications lines operating at up to 1800 bps asynchronously and up to 9600 bps or 64,000 bps synchronously can be accommodated. Local connections of up to 38,400 bps can also be accommodated.

The Master Control Program, included under CMS, provides a virtual, multiprogramming environment for concurrent execution of up to 10 programs. Software also includes data entry support for operation of a B 870 or B 860 system as a key/disk or direct data entry system.

CONTROL STORAGE: See the table on page M11-112-452.

REGISTERS: The B 800 contains both hardware and software registers. Listed below is a brief summary of the register complement.

Hardware Registers:

- BSW—a matrix of gates used to shift a parallel input data word left or right a number of places.
- A1, A2, and A3—16-bit registers used for temporary storage of data being transferred from the adder via the BSW.
- B Register—a 16-bit register which provides the primary interface between S-level (user) memory and the

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COBOL on the B 800 is based on American National Standard COBOL 74. The COBOL compiler runs on any B 800 processor with at least 80K bytes of main memory. The compiler itself is actually broken up into about 10 segments to fit into a minimal main memory.

The B 800 RPG compiler permits programs written in IBM RPG or RPG II, or in most other versions of the RPG language, to be compiled and run with little or no change. RPG programs are automatically segmented during compilation, so that programs can be written without the usual limitations imposed by the host computer's memory capacity. Again, the compiler is divided into numerous segments that are automatically called in when needed, so the RPG compiler can run on a B 800 system with 80K bytes of memory.

Several special-purpose programming languages are also available on the B 800 systems.

The Pocket Select Language (PSL) is specifically designed to produce code that allows the user to determine the formats of documents and to pocket-select them, based on format or field values, when document-sorting peripherals are configured. PSL bears some resemblance to COBOL in both concept and use.

The Audit Entry Language (AEL) consists chiefly of record names and field descriptions. Its function is to provide control over the formats of input data records that are generated on Burroughs Audit Entry Computers (the AE 501, for example).

The Network Definition Language (NDL) is a special-purpose, parameter-driven programming tool that enables users to define and generate customized network controller programs for data communications applications. NDL handles remote and directly connected terminals in such a way that the user can write programs in the same manner as for conventional on-site peripheral devices.

The Message Processing Language (MPL) is a high-level language for generating installation-tailored message control programs. The message control program provides the interface between the network controller and the user application programs by decoding, validating, and directing incoming messages to the appropriate user program for processing. This program can also record all processed messages on secondary storage for audit purposes and place messages intended for out-of-service terminals in temporary storage on disk.

The Data Control System (DCS) is a comprehensive user-oriented software system designed to provide interactive audit entry input, reporting, inquiry, file maintenance, and interactive conversational prompting capabilities. In addition, this system provides uniformity in operating procedures between different programs, thereby adding to the simplicity of the total system.

- I/O controls. The B Register is also a secondary input to the adder.
- Memory Information Register—a 16-bit register utilized as a buffer for data written in memory or sent to a device.
- Microprogram Count Register—a 14-bit register used as a program counter.
- Auxiliary Microprogram Count Register—a 14-bit register used to store the address for jumps and subroutine returns within microprograms.
- Memory Address Register—holds the eight low-order bits of a memory address.
- BR1 and BR2—8-bit used to hold a device address or the base address of a 256-word block of data.
- Counter—an 8-bit register whose function is primarily loop control.
- Literal Register—an 8-bit register used to temporarily store literals in the microprogram.
- Control Register—stores all control signals from ROM and is 40 bits long.
- Condition Register—functions as a 16-bit unit where individual bits can be tested by the microcode.
- Shift Amount Register—utilized in conjunction with the BSW to control the loading of shift amounts and the sequencing of shift operations.

Software Registers:

There are approximately 20 software registers. The least important of these are the 8-bit left Platen Forms Count and Forms Limit Registers; their right counterparts; the 16-bit Program Key Table and Numeric Print Mask Address Registers; the 8-bit Desired Print Position Register; the 1-bit Ribbon Register; and the 16-bit Inquiry Terminal Identifier Register. Other software registers include:

- Acum—a 64-bit register which serves functions of arithmetic, shifting, field isolation, communication-width system control, logical arithmetic, and console input.
- DBT—a 16-bit register which stores the I/O descriptor table base address.
- IX1, IX2, IX3, and IX4—16-bit index registers.
- BCPR Register—provides communications from the system control program to the user program.
- REM—a 64-bit register which holds a remainder after division and scaled-off digits after multiplication.
- SR Register—controls scaling and/or rounding for multiplication and division and is five bits long.
- SRJE Register—points to the latest entry in an 8-level, 16-bit-wide circular subroutine return-to stack and is 16 bits in length.
- SRJS Register—a 16-bit register that points to the latest entry in a 4-level, 16-bit-wide circular subroutine return-from stack.

INTERRUPTS: The B 800 Series processors use a "soft" interrupt system, meaning that interrupt conditions do not cause any automatic hardware actions. Instead, the recognition of interrupt conditions and the initiation of the appropriate actions are completely under software

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➤ The Computer Management Distributed Information Software (CMDIS) system, used on the B 860 and B 870 communications processors, provides a distributed data processing environment to B 800 users. The CMDIS system is structured around a basic set of program products designed for data communications operations and control. It includes a system communication module, the On-Line Data Entry System (ODESY) for use with CRT terminals, a command-and-edit (CANDE) module for on-line program and data file creation and the Transaction Distribution System (TDS).

There are approximately 35 utility programs in a package sold separately for the B 800. The utility package includes programs to print disk directories, sort, squash disk files, copy disks, dump files from various peripherals to other peripherals, dump programs from disk to various peripherals, and load programs from various peripherals. (For the fun-loving, games such as battleship, golf, and blackjack, are also available from your salesman.)

Since the B 801 is object-code compatible with the B 700 systems, while the other B 800 configurations are at least source-code compatible, Burroughs can utilize the dozens of application programs that have been developed for the B 700 since 1973. Accounting programs run the gamut from payroll to general ledger, while specific packages have been developed for practically every industry: banking, manufacturing, wholesaling, retailing, medical clinics, hospitals, local and state governments, contractors, fuel oil, and motor freight.

As alternatives to the Burroughs packages, numerous software houses specialize in writing customized programs for the B 700 and B 800 computers.

Maintenance service and technical support for the B 800 systems are provided worldwide by Burroughs' own support personnel.

Professional training is available for those who purchase standard software packages. Burroughs training centers are located in areas such as Philadelphia, Syracuse, Detroit, Atlanta, Chicago, Dallas, Los Angeles, San Francisco, and Pasadena. Currently, tuition is about \$110 per day, but some management courses are free. Training on specific packages can be arranged in some local areas, provided at least five students are enrolled and adequate classroom facilities are available. Some modules require one day of training, while complete systems may require up to 17 days of classroom work. Generalized courses include subjects such as Operator Training, COBOL, RPG, and Introduction to Computers.

COMPATIBILITY AND COMPETITION

Software compatibility is one of the greatest strengths of the B 800 family. Burroughs has built in a well-defined growth route for current B 700 users to follow. They can upgrade to a B 801 without any conversion, and later upgrade their B 801 to a B 810, B 820, or B 830 by simply ➤

➤ control. Interrupts are handled by servicing the highest-priority device first.

PHYSICAL SPECIFICATIONS: The processor unit is 22.5 (B 810 or B 801) to 45 (B 830) inches wide, 29.25 inches deep, 44 inches high, and weighs 335 to 565 pounds.

Power requirements are 120/208 or 120/240 VAC +5, -10 percent at 60 Hertz \pm 1 Hertz. The system requires 3.9 to 5.9 KVA. The operating environment is from 60 to 100 degrees Fahrenheit with a humidity tolerance ranging from 10 to 80 percent noncondensing. Additional air conditioning above normal office levels is not required except in extreme operating environments. The system dissipates about 2730 BTU's of heat per hour. General machine requirements indicate the need for a floor area of 10 by 4 feet exclusive of operator and service requirements. Configurations involving tape and disk will affect operating temperature and humidity ranges.

INPUT/OUTPUT CONTROL

I/O CHANNELS: Direct memory access channels are provided for disk and programmable data communications subsystems. For each data/control word transferred, one cycle of processor time is stolen. The maximum I/O data transfer rate is 2 million bytes per second. See the table on page M11-112-452 for more details.

SIMULTANEOUS OPERATIONS: All I/O controls are buffered to permit overlapped read/write/compute operations.

CONFIGURATION RULES: Each device or subsystem attached to a B 800 system requires one I/O channel except the phase-encoded magnetic tape unit and the single-line controller, which require two. Some assignments to particular I/O ports are standard. These fixed assignments vary from model to model. A maximum of 2 line printers can be configured.

WORKSTATIONS: Typical configurations of terminals might include a maximum of four Direct Data Entry (DDE) stations, two DDE stations and three to six TD terminals, or one DDE station and a string of TD terminals where the limits of the string are determined by the activities of the terminals, the line speeds selected, and the desired line response time. If no DDE stations are used, from 4 to 10 TD terminals represent a practical configuration.

DISK STORAGE: Up to four disk cartridge drives can be used with the B 800, with a combined capacity of 36.8 million bytes. Up to 2 fixed disk drive subsystems can be used for a total of 75.2 million bytes.

MAGNETIC TAPE: See CONFIGURATION RULES.

PRINTERS: B 800's can have up to 2 line printers, with a printing console acting as back-up or as a third line printer.

MASS STORAGE

A 9489-5 or -17 INDUSTRY-COMPATIBLE MINI-DISK (ICMD) DRIVE: This floppy disk drive is available either as a free-standing unit (-17) or as an inbuilt unit (-5) on all B 800's. A subsystem is composed of a controller and one ICMD drive. The ICMD drive reads only one side of each diskette. Each diskette stores 243K bytes of data, with 128 bytes per sector, 26 sectors per track, and 77 tracks per diskette (including 3 alternates). Track-to-track positioning time is 20 milliseconds per step, and settling time is 10 milliseconds, and the data transfer rate is 31K bytes per second. The ICMD is manufactured by Burroughs.

A 9489-11 OR -12 BURROUGHS SUPER MINI-DISK (BSM) DRIVES: These floppy disk drives are available as a free-standing unit. The BSM subsystem consists of a control- ➤

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➤ recompiling the source code after passing it through a filter program. Once the programs have been recompiled, they will be compatible with the larger B 1800 Series computers, again providing a clearly defined growth path.

From a competitive standpoint, the B 800 systems are versatile enough to compete with the IBM System/34 on the low end (\$26,300) and with the DEC Datasystem 350 on the high end (\$52,000). Burroughs salesmen will have a lot of room to maneuver, since there is overlap both on the low end with the B 80 and on the high end with the B 1800 Series. (The B 80, B 800, and B 1800 systems all feature multiprogramming.) Other competition will come from Honeywell's Level 62, several Basic/Four models, NCR's 8230, the Prime 300 systems, and numerous competitors in the turnkey and systems house fields. Armed with the B 80, B 800, and B 1800, the Burroughs salesperson will be able to offer a system that will provide a suitable cost/performance ratio for each proposal.

The B 800 systems place Burroughs in a strong competitive position, especially where the user desires a total commitment from a single vendor (hardware, software, training, and maintenance). With extensive application programs waiting in the wings, and with more than 3000 B 700 installations as candidates for upgrades, Burroughs should be successful with the B 800.

USER REACTION

Twenty-nine users (representing 48 B 800 systems) responded to Datapro's 1980 user survey. Of the 29 users, 21 purchased their systems, 3 rented, and 5 leased. Accounting functions represented the highest percentage of applications (24), followed by Payroll/Personnel (14), Manufacturing (10), Service Bureaus (6), and Transaction Processing (5). Fourteen used contract programming as their source of application programs, while 13 used either ready-made programs from the manufacturer or proprietary software, and 12 used in-house personnel.

The number of workstations in operation averaged 5 per user. Memory capacities ranged from 64K bytes to 148K bytes (averaging 130K bytes per user), and disk capacities from 4.6M bytes to 130M bytes (40.6M bytes per user). A majority of those surveyed indicated they used both the CMS and MCP operating systems; fourteen percent had data base management systems, and fifty-five percent employed data communications monitors. The principal programming languages were COBOL (27) and RPG (6).

The ratings assigned by the 29 users responding to our survey are summarized in the following table:

	Excellent	Good	Fair	Poor	WA *
Ease of operation	10	13	6	0	3.1
Reliability of mainframe	7	15	5	2	2.9
Reliability of peripherals	4	15	7	3	2.7

➤ ler and either a dual BSM drive or one or two single BSM drives. The BSM has the capability of reading and recording on both sides of the floppy disk by means of two read/write heads. Each diskette stores one million bytes, with 180 bytes per sector, 32 sectors per track, and 88 tracks on each side of the diskette. Track density is 64 tracks per inch, with a track-to-track positioning time of 20 milliseconds per single step and a settling time of 80 milliseconds. Average access time is 266 milliseconds, and the data transfer rate is 45K bytes per second. BSM drives are available on all B 810, B 820, and B 830 configurations. The drives are manufactured by Burroughs.

A 9489-1 BURROUGHS SUPER MINI-DISK (BSM) DRIVE: This is the designation of the built-in version of the 9489-11.

B 9480/9481 DUAL CARTRIDGE DISK SUBSYSTEM: Provides low-cost random-access data storage on removable single-platter cartridges. Two dual-drive models are available:

Model	Capacity, bytes	Avg. Access Time
9480-22	4.6 million	145 milliseconds
9481-12	9.2 million	100 milliseconds

Each cabinet houses two drives.

Each drive accommodates one disk cartridge and has two read/write heads, one serving the top and one the bottom recording surface of the cartridge. The disk cartridge is 15 inches in diameter, 1.5 inches high, and weighs 5 pounds. The two drives are "stacked" so that the unit occupies less than five square feet of floor space. Data is recorded in 180-byte segments.

The 9480-22 has an average head positioning time of 125 milliseconds, an average rotational delay of 20 milliseconds, and a data transfer rate of 193 bytes per second. The 9481-12 has an average rotational delay of 20 milliseconds, and a data transfer rate of 193K bytes per second. The controller is similar to one utilized on the ICMD drives and contains two 200-character buffers.

With the use of the B 383-3 disk multiplexer (MUX), a B 800 system can use up to 4 dual disk cartridge drives for a maximum capacity of 36.8 million bytes.

Disk cartridge drives can be configured on all B 800 models. The drives are manufactured by Burroughs.

B 9493 FIXED-DISK DRIVES (FDD): Four models of fixed-disk drives are available for use with the B 810, B 820, and B 830 processors:

Model	Capacity, bytes	Avg. Access Time
B 9493-9	9.4 million	55 milliseconds
B 9493-18	18.8 million	55 milliseconds
B 9493-28	28.2 million	55 milliseconds
B 9493-37	37.6 million	55 milliseconds

One I/O port is required for the controller (B 384-2), and a maximum of two fixed-disk drives can be configured. In order to facilitate proper disk backup, only one B 9493-37 FDD may be used on a system. In addition, the MUX will support one B 9493-18 FDD and one disk cartridge drive for backup. This can provide a maximum of 65.6 million bytes of disk storage. There are 180 bytes per sector, 64 sectors per track, 406 tracks per surface, and 4 surfaces utilized in the B 9493-8. Expanded capacities are accomplished by adding platters. (Each platter holds 9.4 million bytes.) The data transfer rate is 384K bytes per second.

B 9387 DISK PACK DRIVES: Two dual disk pack drive units and an incremental dual drive unit are available for use in B 820 systems: ➤

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	Excellent	Good	Fair	Poor	WA*
Maintenance service:					
Responsiveness	5	8	12	4	2.5
Effectiveness	4	12	6	7	2.4
Technical support:					
Trouble-shooting	1	5	14	9	1.9
Education	2	5	14	5	2.1
Documentation	1	10	8	9	2.1
Manufacturer's software:					
Operating system	8	13	4	2	3.0
Compilers and assemblers	4	10	10	2	2.6
Application programs	1	12	7	3	2.5
Ease of programming	4	13	9	0	2.8
Ease of conversion	3	12	5	3	2.3
Overall satisfaction	4	10	9	4	2.5

*Weighted Average on a scale of 4.0 for Excellent.

When asked to respond to the significant advantages of the system, 59% indicated the system was easy to expand/reconfigure, 35% were happy with response times, 24% said that productivity aids helped them to keep programming costs down, and 21% said programs and data were compatible as the vendor promised. On the negative side, 45% said delivery of required software was late, 41% said delivery and/or installation of equipment was late, 38% indicated the vendor did not provide all promised software or support, and 35% said the system proposed by the vendor was too small.

When polled on their plans for a system replacement in 1980, 20 of the 29 users had no plans to do so, 4 said yes with the same manufacturer, and 4 said yes with a different manufacturer. Asked if they would recommend the system to other users, 15 said yes. □

Model	Capacity (bytes)	Avg. Access Time
B 9387-11	65.2 million	33 milliseconds
B 9387-12	130.4 million	33 milliseconds
B 9484-5	130.4 million increment	33 milliseconds

One B 387-2 disk drive control is required for the first drive unit, and a maximum of three increments can be added to a disk pack system, allowing a total of four 130.4-million-byte dual drive units for a maximum capacity of 521.6 million bytes of on-line storage. The controller is included in the initial disk pack drive price and serves as a separate processor for all disk pack functions. There are 180 bytes per sector, 90 sectors per track, 815 tracks per surface, and 5 of 6 surfaces are used. Five sectors are reserved in each cylinder for replacing bad sectors, and one cylinder is reserved. Each surface has one read/write head. The data transfer rate is 497.9K bytes per second.

INPUT/OUTPUT UNITS

See the Peripherals/Terminals table on page M11-112-453 for units other than the AE systems, B 9347-2, and B9343-120, which are described below.

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 five audit entry data preparation system models offered by Burroughs. The AE 501 system is the oldest entry in the current line, having been announced in September 1975. The AE 511 and AE 513 were introduced in November 1976 and are currently being delivered. The AE 411 and AE 412 are scheduled for delivery in the fourth quarter of 1979.

All AE systems include 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.

The basic 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 minidisk drive.

The basic AE 422 is a nonprinting version of the AE 412, having the same characteristics with the exception of the omitted matrix printer.

The basic AE 511 and AE 513 have the same characteristics as the AE 412 with the exception of the data storage media. The AE 511 uses a 239,000-byte magnetic tape cassette for data storage, and the AE 513 uses a Burroughs Super Minidisk having 1 million bytes of data storage capacity.

The basic AE 501 system includes the matrix printer, a magnetic tape cassette unit with a data storage capacity of 239,000 bytes, and one asynchronous or synchronous data communications line.

The AE 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 9347-2 DIRECT DATA ENTRY STATION (DDES): The DDES is an operator-oriented data capture system that can be used with the B 800 Series systems. It is composed of four integral subsystems: display, keyboard and keyboard indicator assembly, power supply, and electronics assembly. The display is the same 256-character Self-Scan panel used in the Burroughs TD 700 and TC 5100 Series. The keyboard and keyboard indicator assembly is a version of the one used in the AE 501. Program select keys have increased in number from 16 to 24, while keyboard indicator lights have increased from 29 to 30.

While the DDES is often configured for on-line, high-speed data entry and inquiry, in some B 800 configurations the DDES is used as an operator console to communicate with the MCP operating system. This is the first time that Burroughs has introduced a paperless operator console for use with its small disk systems. With the DDES as an operator console, system messages are displayed and then stored on disk, and can be printed on a line printer at a later time. The storage of all messages is enforced and automatic; messages can be recalled at will by the operator.

When used as an input device under the SCP software, the DDES acts the same as it would on a B 700. Under those conditions, several environments have been defined. Their requirements are given in the following table. The table is based on up to four DDES units on-line with an average requirement of 2K bytes for each AEL (Audit Entry Language) program.

Batch Job	Number of DDES Units	Required B 800 Memory Capacity
No batch	4	40K bytes
Small batch (8K)	4	48K bytes
Medium batch (14K)	1	48K bytes
Large batch (16K)	4	56K bytes

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► Unlike other AE devices, the B 9347-2 has no peripherals of its own, but rather relies solely on the direct interfaces of the B 800. This is particularly important in consideration of the mass storage requirements of the B 800 with DDES.

When used in the CMS environment with multiprogramming, the DDES interaction is handled by the DCP, which uses the Network Definition Language (NDL) to process all information.

The DDES has six machine states: ready, accept, load, operation, unload, error. In each state, the DDES can accept only certain program signals via the keyboard. All others are either ignored or cause error procedures to be initiated. Operator communications include prompting messages, an audible alarm, program control indicators, and error message display.

The Audit Entry Language (AEL), developed for the DDES, is a simplified language with strong editing capability. AEL is designed to be used by the customer with no programming experience and a minimum of training. At the moment of input, AEL interacts with selected B 800 disk files for verification of valid account numbers and visual display of related alpha descriptions. A complete audit trail is provided by line printer listings of all entered data.

B 9343-120 PRINTING CONSOLE: This 120-cps printing console is similar to the popular L 9000 Series minicomputer console. Since Burroughs wants to maintain compatibility with previous B 700 programs that used the L Series-type console, the printing console on the B 800 models must be software-compatible, and therefore almost identical. The B 9343 features a typewriter keyboard, a 10-key numeric pad, 255 printing positions with dual independent forms control mechanisms, front-feed form insertion, and 24 program select keys that can be used with application software to provide operator control over branching and other decisions. Besides having hardware and software compatibility when upgrading to a B 800, L Series users will also experience operator compatibility, since the operator will be using the same basic console.

The B 9343 provides three functions on B 800 systems: first, as an operator's console, the interaction between the MCP operating system and the operator is recorded on paper for immediate reference; second, the console is used as a data entry device in conjunction with application software; and third, the console can be used as a back-up printer for printing at the same time as the normal line printer(s), or it can be used exclusively in the event that the line printer(s) are down. Whether the B 9343 is used for any or all of the above functions will be dependent upon the system software that is in use at the time.

DATA COMMUNICATIONS

The B 800 Series permits data communications through the use of a B 358-4 Data Communications Pre-Processor (DCPP), which takes one port and allows up to four B 658-11 single-line adapters. Any or all lines may be either modem- or direct-connected to the single-line adapter. In addition, any or all lines may use the B 658-14 single-line adapter for DDES direct connect.

Typical configurations of terminals might include a maximum of four DDE stations, two DDE stations and three to six TD terminals, or one DDE station and a string of TD terminals where the limits of the "string" are determined by the activity of the terminals, the line speeds selected, and the desired line response time. If no DDE stations are used, from 4 to 10 TD terminals will represent a practical configuration.

Another method is to use a single B 658-9 two-line Auto Call Unit with each DCP. Each line could be attached to a B 658-11 single-line adapter, and then to a TA 714 Auto Call Data Set or a Bell 801 Data Set.

For direct-connect purposes, a B 358-4 DCP can be connected to a B 810, B 820, or B 830 CPU under CMS software, and each line can then go to a B 658-4 line adapter for DDES stations, or to a B 658-11 line adapter and then through a B 552 direct-connect kit to qualified terminals.

Qualified terminals include the Burroughs TD 700, TD 730, TD 800, TD 830, TC 3500, TC 3600, TC 3800, TC 3900, TC 4000, TC 5100, TC 500, TC 600, TC 700, TC 750, DC 140, DC 110, DC 120, DC 125, TU 700, TU 1700, TU 1800, TT 142, TT 602, TT 650, S 1000, and B 80-100 series terminals.

Permissible data sets include the Burroughs TA 713, TA 714, TA 783, TA 734-24, TA 733-48, TA 753, TA 1201, TA 1202, TA 1203, TA 1310, TA 1801, TA 2401, and TA 2403, and the Bell 103 A/F, 201 A/B, 202 A/C/D, 208 A/B, 209 A/B, and the 801 A & C auto call units.

The single-line data communications feature enables synchronous or asynchronous data transmission at rates up to 9600 bits per second. It can be used to transmit data to another B 800, to a B 800 from a TD series terminal, to a larger Burroughs or other vendor's host mainframe, or to accept data from a host processor for printing at the local site. The B 800 can also be made to look like an IBM 3780 for communications to an IBM 360 or 370.

The B 358-4 Data Communications Pre-Processor operates independently of the CPU to permit simultaneous handling of one to four concurrent lines, which can be asynchronous or synchronous at rates from 75 to 9600 bits per second. It is programmed using the Network Definition Language (NDL) that is used in data communications networks supported on the entire Burroughs B Series computer family.

One or two data communications processors (DCP) can be attached to the B 877. Each of these processors is capable of servicing up to 16 lines concurrently in either a full- or half-duplex mode in a multipoint or point-to-point network. The DCP is a microprocessor with 8192 12-bit words of memory. The DCP memory contains the NDL interpreter and communicates with the main B 877 memory at speeds up to 2 megabytes per second via a direct memory access channel. The DCP is capable of operating concurrently with the main processor. Data communications line characteristics are fully controlled by the MCP. NDL offers full programmability for each line.

Line characteristics include odd, even, or no parity; 5-, 6-, 7-, or 8-bit characters; asynchronous transmission to 1800 bps; synchronous transmission to 9600 bps; two-wire direct connect to 9600 bps; Burroughs direct connect to 38,400 bps; and broad-band transmission to 50,000 bps. Up to 14 different asynchronous clock rates can be accommodated by the DCP.

DC 140: To provide more efficient communications with a central site, Burroughs also offers the DC 140 Series System Processor. The DC 140 has its own peripheral capabilities including up to four magnetic tape cassette drives, reel-to-reel magnetic tape drives, punched paper tape units, 80- and 96-column card units, 85 to 350 lpm printers, and data entry and display units. Present in the DC 140 is a 64K-byte MOS memory with a 1.5-microsecond cycle time and a 1.2 microsecond access time. Approximately 14K bytes of memory are dedicated to microcode, with the remainder available for user programs. Word length is 64 bits. Transmit and receive buffers can be programmed to be as large as 4096 characters. Half-duplex operations are standard, with an asynchronous speed of 1200 bps (75, 100, 110, 150, 200, 300, 600, 1800, 4800, and 9600 bps optional) and a synchronous speed of 2400 bps (2000, 4800, 9600 bps optional). Each DC 140 can have up to two independent data communications channels, permitting two different

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speeds at the same time, and two different line connectors. Line control procedures may be Burroughs standard Poll/Select or Point-to-Point, IBM 2260 procedures for four-wire leased line, IBM Binary Synchronous, Burroughs Central Terminal Controller, Burroughs Data Link Control, and auto-answer/auto-call switched lines.

REMOTE TERMINAL PROGRAM 3780 LOOK-ALIKE: A firmware set designed to make the B 800 function as an IBM 3780 remote batch terminal. The set consists of the 3780 Look-Alike Monitor and the 3780 Look-Alike Program. Both the monitor and program require a configuration which includes a B 800 with 32K bytes of memory, a single-line control, a system console, and a disk subsystem. The 3780 Look-Alike Monitor also requires a line printer, and an 80-column card reader/punch is optional. The 3780 Look-Alike Program has options to handle a line printer, an 80-column card reader, and an 80-column card reader/punch.

SOFTWARE

OPERATING SYSTEMS: By changing operating systems, a B 800 computer can take on two very different appearances. Under the System Control Program (SCP) software, the B 800 acts just like its predecessor (the B 700), while under the Computer Management System (CMS) software, the B 800 acts like the B 1800 multiprogramming computer. The only hardware consideration is the minimum memory size—32K bytes for an SCP system, and 80K bytes for a CMS system.

Through the CMS operating system, the B 800 computers utilize a Master Control Program (MCP) that is functionally compatible to the MCP used on the Burroughs B 1800 and B 80 computers. This operating system was designed to simplify the operation and control of the system, and to increase productivity by automatically handling many functions that would ordinarily be handled by an operator or programmer.

Operator communication is provided through a system console that provides messages pertaining to beginning the job, end of job, errors, file requirements, status of the job mix, missing data, or messages generated by user software. The console can be either a B 9343-120 printing console or the B 9347-2 DDES.

The MCP for the B 800 family allows multiprogramming to take advantage of all available resources. It is possible to have three or more programs running simultaneously on a B 800, but memory requirements and disk storage capacity will tend to impose practical limits on the system's multiprogramming capabilities. The B 800 MCP also support virtual memory. COBOL programs are automatically segmented by the COBOL compiler, and only those segments that are necessary are brought into the processor. Typically a program will be broken into input/output functions, constant data, variable data, and executable logic code. This allows the B 800 to process a mix of independent programs, any or all of which may be larger than main memory. The MCP will continually attempt to maximize main memory utilization by accepting new programs or by permitting large portions of active programs to remain resident in main memory.

CMS software can execute existing B 700 programs after the source code has been passed through a "filter" program and then recompiled. After this has been accomplished, the program can then take advantage of devices that were not available on B 700 configurations through the MCP's "dynamic resource allocation," where the MCP assigns alternate I/O devices when available. For example, if the line printers are being used when a program requires printer output, the MCP will make a request to the operator to transfer printing to a B 9343 console (if configured), and will begin printing a report on the 120-cps matrix printer, although the program was written to print on a standard line printer. Disk alloca-

tion, memory assignments, program priority, and other functions are also under the control of the MCP.

The CMS software is loaded by simply inserting a disk on which the operating system is resident when warm-starting the B 800 (usually the first thing in the morning). Likewise, in order to load the SCP software, a disk holding the SCP operating system is used when warm-starting.

Under SCP, the B 800 utilizes an interrupt/resume or checkpoint/restart function, which rolls out the present status of the machine and its processing onto disk to allow a high-priority job to be loaded into the system. Following completion of the high-priority run, the first program can be restored and processed.

If a batch program is run concurrently with transaction input from DDES, a slight degradation will occur because of the interrupt/resume facility used by the batch job. This form of concurrency between a batch job and transaction in/out is the only multiprogramming capability offered on the B 800 under SCP software. (This type of "multiprogramming" is typical of the procedures used on many of the systems that will be competing with the B 800.) If the DDES units are utilized in an SCP environment, the memory size must be increased to 48K bytes.

The system control program controls the maintenance of a system log which uses the B 800's printing console to produce a journal record on one side of the carriage.

The full size of the SCP Interpreter is generally about 16,000 bytes. The main memory requirements for the Interpreter will vary from 5K to 32K bytes depending upon the peripheral requirements of the program. The system's DIC (Dynamic Interpreter Configurability) will configure only the microcode that is required to execute each particular application program. Various other non-resident segments of the Interpreter are brought into main memory as they are needed for each program.

SCP has the ability to handle up to four B 9347-2 DDES units. When the DDES option is operational, SCP checks for the presence of a character from the attached B 9347-2 station(s) at the end of each S-level instruction or every 500 microseconds (whichever occurs first). The appropriate Audit Entry program is given control if a character is found. The character is then processed according to the proper format specification, and the batch job is resumed until another character from a DDES is found.

The SCP I/O manager has the capability of handling automatic I/O error retries. SCP also contains trace and dump facilities, as well as operational recovery procedures. Code segmentation of user programs enables the use of overlays, with resultant efficient utilization of memory.

LANGUAGES: Both COBOL and RPG are supported under SCP or CMS. For the B 812, SCP also supports a Pocket Select Language for MICR readers. SCP supports both a standard and augmented Audit Entry Language for several models of the B 800. For data communications environments, the Network Definition Language and Message Processing Language are supported.

The B 800 COBOL language is an essentially complete implementation of full American National Standard COBOL 74. COBOL object programs are regarded as a collection of logical segments which can be loaded and executed individually or in groups; thus, programs can be written without the usual limitations imposed by the computer's memory capacity.

The B 800 COBOL language is based on American National Standard COBOL 74. COBOL object programs are regarded as a collection of logical segments which can be loaded and executed individually or in groups; thus, programs can be

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► written without the usual limitations imposed by the computer's memory capacity.

The COBOL compiler runs on any B 800 processor with at least 80K bytes of main memory, a line printer, and a disk drive. Object programs generated by the COBOL compiler are expressed in an S-language that is oriented toward efficient handling of 4-bit digits or 8-bit characters.

The *B 800 Report Program Generator (RPG)* is a compiler-driven language. The compiler converts source programs written in the widely used RPG language into object programs that can be executed by B 800 systems. The compiler permits programs written in IBM RPG or RPG II, or in most other versions of the RPG language, to be compiled and run with little or no change. RPG programs are automatically segmented during compilation, so programs can be written without the usual limitations imposed by the computer's memory capacity. The RPG compiler runs on any B 800 processor with at least 80K bytes of main memory plus a line printer and disk drive.

The *B 800 Pocket Select Language (PSL)* is specifically designed to produce a PSL code file in S-language that allows the user to determine the formats of documents and to pocket-select them based on format or field values. The file built on PSL resides on disk and is utilized by the PSL Interpreter. Pocket Select Language is operational on a B 812 with a minimum of 80K bytes of memory, a cartridge disk drive, a line printer and a MICR Reader/Sorter. PSL bears some resemblance to COBOL in both concept and use. A Pocket Select Language Generator is also available to create a PSL source program from PSGEN input parameter cards.

The *B 800 Audit Entry Language (AEL)* consists chiefly of record names and field descriptions. Its functions is to provide control over the formats of input data records. No logical control beyond format considerations is inherent in the language. AEL permits sequencing of input data to fit the sequence of the source document and to write the data to disk in the format required for batch interfacing. All defined fields fall into one of six categories. Alpha fields place alphanumeric data into a record and may be tested for existence in a tag file. Constant fields place either an operator message on the screen or constant strings in a record. Increment fields function to add constants to accumulators. Numeric fields, which may be 4-bit packed digits or 8-bit bytes (with or without sign), may be range-checked, check-digit verified, searched for in a tag file, or added to or subtracted from an accumulator. Blank fields may clear the screen or blank part of a record, while accumulator display fields display the contents of an accumulator on the screen.

There are several extensions to standard AEL for the B 800 systems, including a program information format giving information about the data file to be created, such as data file name, disk drive number, and number of records in a file, along with the blocking factor, record size, and the size of the intermediate work file. Also, blanks may be used in AEL source programs for spacing, but will be ignored by the compiler. Leading zeroes of all integers will also be ignored by the compiler.

AEL features include the following: up to 100 accumulators may be utilized and incremented or decremented; up to 10 error messages or warnings may be printed for each AEL source line, directly below the line; accumulators may be checked for non-clear conditions; and numeric data to be displayed on the screen may be edited by a picture specification. All error messages may be defined by the programmer and displayed any place on the screen at the programmer's option.

The DDES program generated will vary from a minimum of 486 bytes of a maximum of 6480 bytes. An average program will be 2K bytes. During operations with DDES,

approximately 16K bytes are required by the SCP Interpreter and 16K bytes by the DDES manager.

Network Definition Language (NDL) is a special-purpose, parameter-driven programming tool that enables users to define and generate customized Network Controller programs for data communications applications.

These programs are executed when required by the NDL Interpreter. The Network Controller program handles line disciplines, buffer management, message queuing, character translation, and automatic retries, and supervises the flow of messages between user-coded programs and remote terminals. This enables the user's application programs to deal with remote and directly connected terminals in the same manner as conventional on-site peripheral devices.

After the programmer defines his custom Network Controller in the NDL syntax, the source statements are processed by the NDL Compiler and converted into the necessary object code and tables. Various line disciplines may be programmed in NDL and are stored as reusable library routines, known as request sets. Standard request sets for many line procedures are available from Burroughs. A console printer and disk subsystem are also required.

Message Processing Language (MPL) is a high-level parameter-driven language for generating installation-tailored Message Control Programs. The Message Control Program provides the interface between the Network Controller and the user application programs by decoding, validating, and directing incoming messages to the appropriate user program for processing. This program can also record all processed messages on secondary storage for audit purposes and place messages intended for terminals out of service in temporary storage on disk.

The *B 800 Report Creation System* consists of three programs designed to retrieve and display information in a report format. The File Generation program interactively accepts and edits both file and record specifications entered from the console keyboard. The Report Specification Generator program functions to input the specifications of a desired report. The Report Writer program utilizes the parameter file from the report specification generator to produce the desired report. Up to five variables may be loaded at run time. Allowable operations include addition, subtraction, multiplication, and division; record selection; comparison testing; and listing. The system requires a B 800 with a minimum of 32K bytes of memory, a system console, and a disk subsystem. COBOL is required for compilation.

The *Data Control System (DCS)* is a comprehensive user-oriented software system designed to provide interactive audit entry input, reporting inquiry, file maintenance and interactive conversational prompting capabilities. In addition, this system provides a high degree of uniformity in operating procedures between different programs, thereby adding to the simplicity of the total system.

UTILITIES: Burroughs offers 35 programs and micro-coded routines to the B 800 user. Basic requirements are a B 800 processor with a minimum of 80K bytes of memory and a disk subsystem. The utilities include the Check Digit Table Generator; Card List; Card Load to Disk; Cold Start from 80-column cards, 96-column cards, magnetic tape, or tape cassette; Disk Directory List; Disk File List; Dump/Purge File; Disk Primer Cold Start; Dump Disk Files to Tape; Create Cold Start Tape/Cassette; Object Program-Disk to 80-column card, or to 96-column card; 80 to 96 Object Program Conversion; Paper Tape Copy; Restart; Generalized Sort; Disk Squash; Tape/Cassette Copy; Tape/Cassette to Disk; Tape/Cassette List; and Warm Start.

APPLICATION SOFTWARE: Burroughs presently offers application programs either by the module or by the ►

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► package. All B 700 programs can be utilized on B 800 SCP systems without modification, and can be utilized with minor modifications on CMS systems. Currently available packages include the Bank Business Management System, Thrift Business Management System, Credit Union Business Management System, Contractor Business Management System, Fuel Oil Business Management System, Manufacturing Job Cost System, Production Control System, Hospital Management System, Public Utility Billing System, Wholesale Business Management System, Wholesale/Distribution BMS On-Line Order Entry and Inquiry System, TBA (Tire, Battery and Accessory) Business Management System, Motor Freight Business Management System, and Commercial Business Management System (Keyboard Entry). For a detailed listing of the individual modules that constitute these systems, please refer to the price list at the end of this report.

PRICING

POLICY: Burroughs offers the B 800 systems for purchase or lease. In addition to the basic one-year lease, Burroughs offers three-year and five-year leases at a discount.

The standard equipment lease agreement includes equipment maintenance and permits use of the equipment during one 8-hour period per day. Additional extra-shift charges are billable for maintenance coverage on a 24 hours/day, 7 days/week basis. Individual monthly maintenance charges are detailed in the price list; not all of these charges were available at press time. Burroughs software technical assistance, for installation support and beyond, is available to B 800 users at a price of \$225 per

day. Hardware installation support for purchased system is billable at \$225 per day. Two days are usually the maximum requirement.

Application software prices quoted in the price list are for an unlimited-time license plan for each designated CPU. Besides this plan, two limited-time (3-to-5 year) plans are available. The first involves an initial payment and an annual fee, while the second involves the same annual fee but divides the initial fee into 12 monthly installments.

Customer education for application programs is charged at a rate of \$100 per day. Some modules require one day, while complete systems may require up to 17 days. Courses on the B 800 hardware and software include subjects from Introduction to Computers (2 days) through B 800_COBOL (10 days). All cost \$100 per day.

Training is available at many Burroughs centers throughout the United States, including Philadelphia, Syracuse, Detroit, Atlanta, Chicago, Dallas, Los Angeles, San Francisco, and Pasadena. Other major centers offering worldwide training include London, Paris, Rio de Janeiro, Sydney, Tokyo, Toronto, Amsterdam, Johannesburg, Stockholm, and Mexico City.

EQUIPMENT: Representative configurations are best shown by the packaged systems offered by Burroughs. These can be evaluated in detail in the price list that follows. ■

EQUIPMENT PRICES

B 800 PACKAGED SYSTEMS		Purchase Price	Rental (1-year lease)	Rental (3-5 year lease)
B 801-200	System includes B 810 1-MHz CPU, 32K bytes of MOS memory, 120-cps console, console control, 4.6M byte disk drive, disk drive control and PF-29 pinfeed	\$ 35,045	\$1,047	\$ 951
B 801-204	Same as B 801-200, except also includes 160-lpm printer and line printer control	40,450	1,210	1,098
B 801-504	System includes B 810 1-MHz CPU, 48K bytes of MOS memory, 120-cps console, console control, 4.6M byte disk drive, disk drive control, 160-lpm printer, line printer control, Direct Data Entry (DDE) control, DDE key station, and PF-29 pinfeed	48,565	1,450	1,319
B 801-604	System includes B 810 1-MHz CPU, 48K bytes of MOS memory, 120-cps console, console control, 4.6M byte disk drive, disk drive control, 160-lpm printer, line printer control, single line control, display, keyboard, and PF-29 pinfeed	49,640	1,484	1,348
—	Utilities for above packaged systems	540	—	—
—	System software for above packaged systems	1,500	—	—
B 835-845	System includes B 820 2-MHz CPU, 80K bytes of MOS memory, 16K bytes of bipolar memory, DDE console and control, 1.0M byte free-standing Super Mini Disk Drive (BSMD), 18M byte fixed disk, fixed disk control, fixed disk multiplexer, 250-lpm line printer and control, data communications pre-processor, B 358-24 4-line expander, B 358-26 4-line half-duplex, B 658-11 line adapter, 8552 direct connect kit, and X0001 "Y" connector	61,700	1,737	1,650
B 845-843	System includes B 820 2-MHz CPU, 112K bytes of MOS memory, 16K bytes of bipolar memory, DDE console and control, 18.8M byte fixed disk, 1.0M byte in-built BSMD, fixed disk control, fixed disk multiplexer, 350-lpm printer and control, data communications pre-processor, line adapter, 4-line half-duplex, and direct connect kit	48,900	1,303	1,238
B 846-843	Same as B 845-843, except includes 28.8M byte fixed disk	51,900	1,414	1,344
B 847-823	Same as B 845-843, except includes 37.6M byte fixed disk and 4.6M byte, 145 millisecond cartridge	55,900	1,553	1,476
B 847-853	System includes B 820 2-MHz processor, 112K bytes of MOS memory, 16K bytes of bipolar memory, DDE console and control, 37.6M byte fixed disk, 18.8M byte fixed disk, 9.2M byte, 100 millisecond cartridge, fixed disk control, fixed disk multiplexer, 350-lpm printer and control, data communications pre-processor, line adapter, 4-line half-duplex, and direct connect kit	62,900	1,748	—
B 848-843	System includes B 820 2-MHz CPU, 112K bytes of MOS memory, 16K bytes of bipolar memory, DDE console and control, 62.5M byte disk pack and control, 350-lpm printer and control, data communications pre-processor, line adapter, 4-line half-duplex, direct connect kit, 1.0M byte BSMD, and fixed disk control	67,900	1,886	1,792
B 849-843	Same as B 848-843, except with 130.4M byte disk pack and control	71,900	1,998	1,898
B 847-793	System includes B 820 2-MHz CPU, 112K bytes of MOS memory, 16K bytes of bipolar memory, 120-cps console and control, 37.6M byte fixed disk, 4.6M byte, 145 millisecond cartridge, fixed disk control, fixed disk multiplexer, 350-lpm printer and control, data communications pre-processor, line adapter, 4-line half-duplex, direct connect kit, 1000-dpm reader/sorter and control, 4-pocket module, 3A control interface, running time meter, real-time clock, and PF-29 dual pinfeed	115,900	3,270	3,109
B 848-793	Same as B 847-793, except with 65.8M byte disk pack and control and 1.0M byte BSMD	127,900	3,607	3,429
B 845-844	System includes B 820 2-MHz CPU, 112K bytes of MOS memory, 16K bytes of bipolar memory, DDE console and control, 18.8M byte fixed disk, fixed disk multiplexer, fixed disk control, 160-lpm printer and control, data communications pre-processor, 4-line half-duplex, line adapter, direct connect kit, 1.0M byte in-built BSMD, display, keyboard, and cables	45,500	1,375	1,306
—	Utilities for above packaged systems	540	—	—
—	System software for above packaged systems	2,500	—	—

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EQUIPMENT PRICES

		<u>Purchase Price</u>	<u>Rental (1-year lease)</u>	<u>Rental (3-5 year lease)</u>
MEMORY OPTIONS				
B 31-2	8K bytes of MOS memory	800	27	25
B 31-4	24K byte memory expansion kit	2,500	70	67
B 31-8	16K byte bipolar memory	4,850	135	128
MASS STORAGE				
B 9489-1	1-million-byte Burroughs Super Mini Disk Drive—in-built Note: This add-on price assumes the previous presence of the B 383-3 disk multiplexer in the B 800 processor	910	34	30
B 9489-5	In-built 243K byte industry-compatible Mini Disk	3,039	84	80
B 9489-11	1-million-byte Burroughs Super Mini Disk Drive—free-standing	2,500	93	83
B 9489-17	Free-standing industry-compatible Mini Disk Drive; 243K bytes	3,296	122	110
B 9489-12	Super Mini Dual Drive; 1.0M bytes	3,815	141	127
B 9481-12	9.2-million-byte dual disk cartridge drive (100 msec. access)	10,163	452	430
B 9480-22	4.6-million-byte dual disk cartridge drive (145 msec. access)	7,010	296	278
B 9493-9	9.4-million-byte fixed disk drive	5,500	204	183
B 9493-18	18.8-million-byte fixed disk drive	9,500	352	317
B 9493-28	28.2-million-byte fixed disk drive	13,510	500	450
B 9493-37	37.6-million-byte fixed disk drive	15,000	556	500
B 9387-11	65.2-million-byte dual disk pack drive and controller	35,020	968	825
B 9387-12	130.4-million-byte dual disk pack drive and controller	47,380	1,310	1,117
B 9484-5	130.4-million-byte dual disk pack drive increment to B 9387-12 (maximum of 3); uses first controller	31,827	969	764
B 387-2	Disk Drive Control for B 9387-11 or B 9387-12	2,060	65	59
B 383-3	Disk multiplexer control	510	15	14
B 384-2	Control for fixed disk drives (all)	1,931	65	59
B 383-4	Control for disk cartridge drives (all)	1,339	48	44
MAGNETIC TAPE EQUIPMENT				
B 9490-25	NRZ magnetic tape cassette; 10-ips	1,689	57	55
B 9497-11	Free-standing NRZ cassette drive	1,689	63	56
B 9497-15	Free-standing PE cassette drive	1,689	63	56
B 9491-2	NRZ magnetic tape; 10K bytes, 800-bpi	7,107	246	220
B 9491-4	40K byte PE magnetic tape; 1600-bpi	12,600	465	395
B 9491-5	40K byte PE magnetic tape secondary unit; 1600-bpi	10,000	334	318
MAGNETIC TAPE CONTROLS				
B 394-2	Free-standing tape cassette; 10-ips	824	27	25
B 394-3	PE cassette control	895	25	23
B 395-2	NRZ magnetic tape; 10K bytes, 800-bpi	1,288	33	30
B 393-1	PE magnetic tape; 40K bytes, 1600-bpi	2,295	77	65
B 9999-6	PE magnetic tape; 40K bytes, 1600-bpi (for B 9491-5 only)	440	15	14
LINE PRINTERS				
B 9246-3	Line Printer, 300-lpm	11,500	380	325
B 9246-6	Line Printer, 600-lpm	14,000	475	390
B 9249-2	Line Printer, 160-lpm	5,990	222	200
B 9249-3	Line Printer, 250-lpm	7,990	296	266
B 9249-4	Line Printer, 350-lpm	10,990	407	366
B 9247-13	Line Printer, 750-lpm	28,840	922	817
B 243-4	Control for B 9249-2/-3	644	20	18
B 244-9	Control for B 9247-12/-13 (ASCII)	1,236	38	35
B 244-10	Control for B 9247-12/-13 (EBCDIC)	1,236	38	35
B 9948-1	12 channel format tape	618	33	30
B 9942-9	Additional train module for B 9247-12/-13	3,605	70	65
B 244	ASCII for B 9247 Series	2,122	59	114
PUNCHED CARD EQUIPMENT				
B 9115	80-column card reader, 300-cpm	7,808	215	191
B 9116	80-column card reader, 600-cpm	9,845	273	253
B 9119-1	96-column card reader, 300-cpm	4,553	121	107
B 115	Card reader control; 300/600-cpm (for B 9115/B 9116)	933	32	27
B 115-2	Control for B 9115/B 9116	906	26	26
B 313-1	Control for B 9119-1/B 9418-2/B 9419-1/B 9419-6	876	27	25
B 9418-2	80-column reader/punch/recorder, 200-cpm (punch only on CMS systems)	876	31	26
B 9419-2	96-column reader/punch/recorder, 300-cpm (card read only on CMS systems)	9,013	296	296
B 9419-6	96-column reader/punch/recorder, 300-cpm	9,528	354	315
B 313-1	Control for B 9119-1/B 9418-2/B 9419-2/B 9416-6	876	27	25
B 9918-5	Added program levels for B 9418-2	515	10	10

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EQUIPMENT PRICES

		Purchase Price	Rental (1-year lease)	Rental (3-5 year lease)
READER SORTERS				
B 9135-2	Reader sorter, 8-pocket, 900-dpm	51,157	1,480	1,332
B 9135-3	Reader sorter, 8-pocket, 900-dpm	62,859	1,925	1,729
B 9137-4	Reader sorter; 8-pocket MICR only	50,796	1,512	1,344
B 9937-11	Reader sorter; 4-pocket module (5 through 16)	11,900	400	375
B 9937-50	Impack Endorser	8,362	245	210
B 9937-70	Basic off-line sort (2 fields)	1,236	34	32
B 9937-71	8-pocket basic off-line sort (2 fields)	1,483	41	38
B 9937-72	Expanded off-line field sort; one additional field sort up to 8 fields	247	7	7
B 9937-73	Extended sort control	2,472	67	63
B 9937-74	Valid character check	247	7	7
B 9937-76	Zero kill (maximum of three)	494	14	13
B 9937-77	No field—No digit (maximum of three)	494	14	13
B 9937-78	Digit override (maximum of three)	494	14	13
B 9937-79	Digit edit (maximum of three)	494	14	13
B 9937-80	Field override (maximum of three)	494	14	13
B 9937-81	Field edit (maximum of three)	494	14	13
B 9937-82	Stacker overflow	494	14	13
B 9937-83	Batch ticket detector	494	14	13
B 9937-84	Resettable item counter	247	7	7
B 9937-85	Non-resettable item counter	247	7	7
B 9937-86	Running time meter	247	7	7
B 9937-87	Mobile carrier	155	—	—
B 9937-88	One-tray document rack	62	—	—
B 9938-1	Multi-rack E13B	16,723	460	393
B 131-1	B 9137-4 Control	773	23	22
B 131-2	B 9135 with endorser option	1,000	42	38
B 132-1	B 9135 Control	773	24	22
B 132-2	B 9135 Control with endorser option	1,030	27	26
TERMINALS				
TD 731	Self-Scan display/keyboard with control for async. data sets and direct-connect communications interface	2,715	120	116
TD 732	TD 731 with peripheral capability added	2,865	130	126
TD 733	Self-Scan display/keyboard with control for sync. data set communications	2,715	120	116
TD 734	TD 733 unit with peripheral capability added	2,865	130	126
TD 737	Self-Scan display/keyboard with control for sync. data set communications and IBM Bi-Sync. data communications procedures	2,715	120	116
TD 738	TD 737 unit with peripheral capability added	2,865	130	126
TD 831	Self-Scan display/keyboard with control for async. data sets and direct-connect communications interface	2,796	124	49
TD 832	TD 831 unit with peripheral capability added	2,951	134	130
TD 833	Self-Scan display/keyboard with control for sync. data set communications	2,796	124	119
TD 834	TD 833 unit with peripheral capability added	2,951	134	130
TD 837	Self-Scan display/keyboard with control for sync. data set communications and IBM Bi-Sync. data communications procedures	2,796	124	119
TD 838	TD 837 unit with peripheral capability added	2,951	134	130
Options for the TD 730 and TD 830 Series Terminals:				
TD 016	A/N source data keyboard (includes 6-foot separation cable)	275	13	—
TD 017	Ten-key auxiliary keyboard (includes 2-foot separation cable)	180	7	—
TD 015-A	Alphanumeric typewriter keyboard	275	13	—
TD 019	Expanded alphanumeric keyboard	700	30	—
TD 019-1	Expanded alphanumeric keyboard with built-in magnetic card reader	900	39	—
TD 105	Non-display of control characters (the display of control characters, such as form delimiters, is inhibited—this feature is available on a special factory order basis only)	206	10	—
Peripherals for the TD X32 and TD X34:				
TD 078-1	Auxiliary magnetic card reader for the TD 015	1,260	42	—
TD 076	Cassette controller (includes one A 9290-25 driver—can be shared by up to four TD's); other peripherals include the A 9249 series of printers and the A 9490-25 additional cassette tape drive	3,255	108	—
TC 4001	Printing Terminal; 60-cps	—	—	—
Intelligent Terminal with TC 4001 Printing Unit:				
TC 5110	With one cassette drive	13,700	433	—
TC 5113	With two cassette drives	16,790	535	—
COMMUNICATIONS EQUIPMENT				
B 351-2	SLC modem connect	773	38	35
B 351-3	SLC direct connect	1,591	54	42
B 358-4	DCPP data communications pre-processor	2,575	108	98
B 358-26	4-line half-duplex SPM	361	11	10
B 358-27	4-line half-duplex SPM	721	23	21
B 552	Direct connect kit	103	6	5
B 658-11	Data communications line adapter (2-wire direct interface)	400	15	13
B 658-7	Line adapter, BDI	680	22	20
B 658-8	Line adapter, BDLC	865	27	25
B 658-9	2-line auto call unit	386	12	11
B 658-14	Direct Data Entry (DDE) line adapter	680	22	20

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SOFTWARE PRICES

		<u>Initial Charge</u>	<u>12 Monthly Payments</u>	<u>Annual Maint. Charge</u>	<u>Monthly License Fee</u>
B800 CMS SYSTEM SOFTWARE					
CM800 NDL	Network Definition Language Compiler	—	—	—	25
CM800 MPL	Message Processing Language Compiler	—	—	—	25
CM800 RPG	Report Program Generator Compiler	—	—	—	25
CM800 COB	COBOL Compiler	—	—	—	25
CM800 UTL	Utilities	540	—	—	15
CM800 PSL	Pocket Select Language	1,260	121	175	35
CM800 MCP	Computer Management System	2,500	—	—	70
CM800 R41	Burroughs RJE—Medium Systems	1,260	121	175	35
CM800 R61	Burroughs RJE—Large Systems	1,260	121	175	35
CM800 HSP	360-20 Look-Alike HASP	1,260	121	175	35
CM800 GMC	B 800 GEMCOS	1,945	186	330	81
CM800 DCI	B 800 Data Control System	585	56	—	24
CM800 INQ	CMS Inquiry	810	78	138	34
B800 AEU	Audit Entry Host Utilities	490	47	59	21
CM800 CON	IBM System 32 to B 800 Conversion Program	—	58	30	—
B800 INT	Hardware/Software Installation Support—2 days	450	—	—	—
SCP SYSTEM SOFTWARE					
B800 UTL	B 800 SCP Utilities	540	—	—	15
B800 SCP	System Control Program	1,500	—	—	35
B800 PSL	Pocket Select Language	1,260	121	175	35
B 800 DEVELOPMENT AIDS					
CM800 DOM	CMS DOMAIN System	1,620	155	275	68
CM800 REP	CMS REPORTER	1,620	155	275	68
CM800 RPO	CMS On-Line REPORTER	2,160	207	367	90
CM800 TE1	Terminal Entry for B 800 TDS-Control MCS, CANDE and ODES Y	1,170	112	199	49
B800 DDE	DDE Program Generator (includes TDS)	585	56	99	24
JOB ACCOUNTING AND COSTING SYSTEM					
B800 JAC	Job Cost, A/P, Payroll	4,800	460	576	200
B800 JAR	Accounts Receivable	1,750	168	210	73
B800 JGL	General Ledger	1,750	168	210	73
B800 JAM	Asset Management	750	72	90	32
B800 JTI	Terminal Interface	1,000	96	120	42
B800 JIC	Inventory Control	1,500	144	180	63
B800 JIV	Invoicing	1,500	144	180	63
B800 JAD	JACS Data Management Module (not required)	4,000	384	480	167
PRODUCTION CONTROL SYSTEM I					
B800 MC1	Bill of Material	1,590	152	191	66
B800 MG1	Stock Status	1,345	129	161	56
B800 ME1	Work Center and Routing	1,590	152	191	66
B800 MJ1	Costing	1,150	110	138	48
B800 MP1	MBMS Payroll	2,030	195	244	85
B800 MS1	Order Release	1,135	109	136	47
B800 MH1	Job Cost Actual	2,270	218	272	95
B800 MQ1	On-Line Data Entry/Inquiry	810	78	97	34
B800 MR1	Material Requirements Planning	3,565	342	428	149
B800 MGL	Manufacturing Ledger	1,435	138	172	60
CONTRACTOR BMS PROGRAM PRODUCTS					
B800 CMS	Data Base Maintenance	—	—	—	—
B800 CP2	Payroll and Labor Cost	1,705	163	205	71
B800 CA2	Accounts Payable	1,705	163	205	71
B800 CJ2	Job Cost Reporting	1,135	109	136	47
B800 CG2	General Ledger	1,135	109	136	47
B800 CQ2	On-Line Inquiry	380	36	46	16
B800 CD2	On-Line Data Entry and Inquiry	865	83	104	36
B800 CE2	Equipment Cost	990	95	119	41
B800 CT8	Contractor BMS Module	7,525	721	903	314
DISTRIBUTION MANAGEMENT SYSTEM					
B800 BPC	BPO Console	3,500	336	420	146
B800 BPT	BPO Terminal	6,500	623	780	271
B800 BAC	AR Console	1,375	132	165	58
COMMERCIAL BUSINESS MANAGEMENT SYSTEM II					
B800 CRO	Accounts Receivable	1,880	180	226	78
B800 CIO	Invoicing	1,930	185	232	80
B800 CCO	Inventory Control	1,600	153	192	67
B800 CMO	Inventory Management	1,600	153	192	67
B800 CPO	Payroll	2,030	195	244	85
B800 CGO	General Ledger	1,435	138	172	60
B800 CYO	Accounts Payable	1,800	173	216	75
B800 CTO	Order Processing Input and Display Terminal System	3,780	362	454	158
B800 CDO	Data Communication Module	810	78	97	34
B800 CID	On-Line Invoicing	2,270	218	272	95

Burroughs B 800 Series

SOFTWARE PRICES

		<u>Initial Charge</u>	<u>12 Monthly Payments</u>	<u>Annual Maint. Charge</u>	<u>Monthly License Fee</u>
CBMS II—ENTRY-LEVEL SYSTEM					
B800 BPS	Bill, Post and Simplified Inventory	3,490	335	419	145
B800 BPA	BSP Inquiry	540	52	65	23
B800 BPE	Bill, Post and Expanded Inventory	4,740	454	569	198
B800 CRS	Accounts Receivable	1,375	132	165	57
B800 CYS	Accounts Payable	1,250	120	150	52
B800 CQS	Payroll	1,375	132	165	57
B800 CGS	General Ledger	1,125	108	135	47
FINANCIAL					
B800 FGL	Financial General Ledger	1,620	155	194	68
BANK BUSINESS MANAGEMENT SYSTEM					
B800 BO2	Bank Business Management System including application program products for BK2, BD2, BC2, BS2, BL2, FG1	12,960	1,242	1,555	540
B800 BD2	Demand Deposit Accounting	2,160	207	259	90
B800 BS2	Savings Deposit Accounting	1,890	181	227	79
B800 BC2	Certificate of Deposit	1,890	181	227	79
B800 BL2	Loan Accounting	3,780	362	454	158
B800 BK2	Audit Entry Proof	1,620	155	194	68
B800 BQ2	Central Information System Inquiry Module	2,160	207	259	90
B800 BU2	Central Information System Update Module	4,860	466	583	203
B800 BP2	Central Information System Reporting Module	1,350	129	162	56
B800 RDP	Remote Data Processing	1,135	109	136	47
SAVINGS AND LOAN SYSTEM					
B800 TSL	CMS Thrift Time Deposit/Loans System	18,900	1,811	2,268	788
B800 NOW	CMS Thrift NOW/Demand Deposit Subsystem	3,780	362	454	158
CREDIT UNION SYSTEM					
B800 CUS	Credit Union System (includes CSL, CCL, CBP, CRP)	7,020	673	842	293
B800 CUI	Inquiry/File Maintenance	3,780	362	454	158
B800 CUO	Update Module	5,400	518	648	225
B800 CSL	CMS Credit Union Share/Loan	2,700	259	324	113
B800 CCL	CMS Credit Union Club Module	1,620	155	194	68
B800 CBP	CMS Credit Union Bill Payments	1,080	104	130	45
B800 CRP	CMS Credit Union Extended Reporting Module	1,620	155	194	68
HOSPITAL BUSINESS MANAGEMENT SYSTEM					
B800 HAF	Patient Accounting System	3,780	362	454	158
B800 HAI	Patient Accounting System with Inquiry	4,050	388	486	169
B800 HAK	Hospital Payroll System	2,355	266	283	98
B800 HAT	On-Line BHAS II	4,320	414	518	180
B800 CGO	General Ledger	1,435	138	172	60
B800 CYO	Accounts Payable	1,800	173	216	75
B800 GPS	CMS Group Practice System	5,105	489	613	213
B800 GEM	GEM Data Kit	855	82	103	36
B800 APM	CMS Group Practice Appointment Module	1,620	156	194	67
CMS SCHOLASTIC II					
B800 SCR	Student Records	3,240	311	389	135
B800 SCS	Student Scheduling	4,860	466	583	203
B800 SCA	Attendance Accounting	2,160	207	259	90
GOVERNMENT					
B800 MO7	Budgetary Accounting System	2,030	195	244	85
B800 GCU	CMS Utility Billing System	3,780	362	454	158
B800 SGP	Government/SCHOLASTIC II Payroll	2,135	205	256	89
B800 GOU	On-Line Utility Billing	4,050	388	486	169
B800 MO6	On-Line Budgetary System	3,700	362	454	157
B800 GEM	GEM Data Kit	855	82	103	36
B800 GOT	On-Line Tax Billing System	4,050	388	486	169