Burroughs B 900 Series

MANAGEMENT SUMMARY

The Burroughs B 900 Series computers, announced in August 1980, are positioned between the Burroughs B 90 and B 1900 small to mid-range computers. The series offers from two to eight times the processing power of the earlier B 800 Series offerings. The processor is software compatible with similar configurations of the B90 and B 1900 systems. The current series consists of the B 920 and B 930 processor systems.

The B 920 is the first model in the B 900 Series. It is based on a multiple-processor, multiprogramming architecture that was developed by Burroughs with several user-oriented goals in mind. High speed, high reliability, ease of use, and on-site expandability are all extensions of the multiple-processor hardware. The systems employ Burroughs' virtual memory concept of operation.

The B 930, introduced in August 1982, is also a multiple processor system (the B 930 employs 3MHz processors as opposed to the B 920's 2MHz) designed for organizations requiring interactive, on-line, real-time processing concurrent with batch processing in either a stand-alone or distributed processing environment. The B 930 features up to eight high-speed 3MHz processors, up to 3.3 megabytes of 64K bit random access memory, over 1700 megabytes of fixed disk storage, a disk file cache module, and high-speed magnetic tape facilities for system backup.
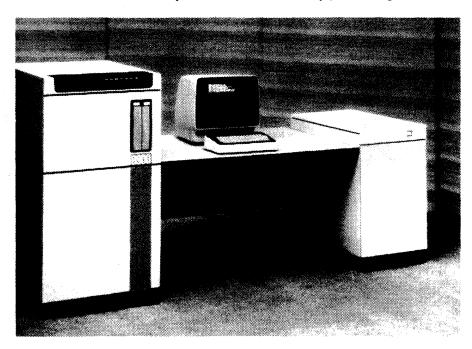
The B 900 Series basic system includes five separate microprocessors, each with its own random access memory, all housed in a single cabinet. The Operating System Processor is configured with 256K bytes of memory to control all of the internal functions of the system. Part of this memory ▷

The B 900 Series is positioned between the Burroughs B 90 and B 1900 small to mid-range computers. The B 920, the first model in the series, is an interactive screen-based system for either distributed processing or stand-alone applications. Like the B 920, the B 930 is a multiple processor system that may consist of up to eight 3MHz processors. Prices for the B 900 Series begin at $23,228.

MAIN MEMORY: 608K to 3.3 megabytes.
DISK CAPACITY: 4.6MB to 1700MB.
WORKSTATIONS: 1 to 36.
PRINTERS: 160 to 1250 lpm.
OTHER I/O: Magnetic tape, flexible diskette.

CHARACTERISTICS

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

Burroughs is considered to be one of the major competitors in the data processing marketplace, with a board 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; specialized banking equipment; word prcessing 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. ▶

The B 920 supports distributed processing and stand-alone applications with a multi-processor arhitecture and multi-programming. The system shown here includes: five processing modules expandable, at user option, to eight processors, 44.6 million bytes of disk, an operator display station and a 300 line-per-minute printer.

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▷ acts as buffer for disk data to be accessible by user progrsms running on another processor. The buffer is accessible at memory bus speeds to optimize disk interaction with user progrsmas. This processor allocates all system resources, allocates tasks to specific processors, and coordinates all processor activities. This ensures top system performance while maintaining an easy-to-use system. All control routines associated with the Master Control Program (MCP), except for disk, are handled by the operating system processor.

The Disk File Management Processor directly interfaces with the appropriate disk devices for optimal file management. This processor has an associated 32K bytes of memory. ROM memory in the Disk File Management processor performs load functions and automatic confidence tests to insure basic system integrity. The Disk File Processor supports an optional 256K- or 512K-byte cache memory to increase throughput.

Two Task Processors are part of the basic system. Each operates in a multiprogramming mode under the management of the Master Control Program on the operating system processor. Each task processor is configured with a minimum of 128K bytes of memory which stores all user programs and user-oriented utilities during their execution. The appropriate interpreters used to execute the user programs are re-entrant and duplicated in each task processor's memory. If a task processor is to be utilized as a back-up for the operating system processor, it must be configured with a minimum of 256K bytes of memory.

The Data Communications Processor interfaces the attached terminals and workstations. This processor includes 64K bytes of memory which contains all information necessary to the management of the data communications processors and control of the network. The Burroughs Network Definition Language (NDL) forms the basis of the network. One data communications processor can handle up to twelve communications lines, with varying types and speeds, with a total bandpass of 96,000 bits per second. A second data communications processor can be added to increase the total bandpass to 192,000 bits per second.

The B 900 supports CMS COBOL as a subset of ANSI '74 COBOL with extensions and CMS RPG as a standard implementation of RPG plus extensions. These extensions take advantage of the CMS hardware and software capabilities. The combination of COBOL and RPG provides the Burroughs user with capabilities for both on-line applications and batch oriented systems.

CMS also support Network Definition Language (NDL) to generate network controller programs. This defines the number of lines, type of terminal, line speeds, modems, and remote or local links required. A Generalized Message Control System (GEMCOS) works with NDL to provide the line between a terminal user and an application program. A Message Processing Language (MPL II) enables the development of specialized on-line applications. ▷

▶ **MODEL: B 920 and B 930.**

DATE ANNOUNCED: B 920, August 1980; B 930, August 1982.

DATE OF FIRST DELIVERY: B 920, October 1980; B 930, September 1982.

NUMBER INSTALLED TO DATE: 250.

DATA FORMATS

BASIC UNIT: 8-bit byte with two decimal digits or one character per word. The microinstruction set has no preferred word or byte boundaries that are visible to the rest of the system.

FIXED-POINT OPERANDS: One to fifteen digits plus sign.

FLOATING-POINT OPERANDS: None.

INSTRUCTIONS: The B 900 is an interpreter-based system using variable micro-logic. Utilizing the microinstruction set, operand lengths permit from 1 to 256 bytes of data to be addressed with a single instruction, and up to eight bits to be addressed in parallel between main memory and the processor.

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

MAIN STORAGE

TYPE: N-channel MOS RAM, 16K bits per chip.

CYCLE TIME: 500 nanoseconds per 8-bit fetch with a 210 nanosecond access time.

CAPACITY: The basic system memory is expandable from 608K bytes to 1.5 megabytes on the B 920, and from 576KB to 3.3 megabytes on the B 930.

CHECKING: Parity standard.

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

RESERVED STORAGE: A variable portion is reserved for microinstruction storage.

CENTRAL PROCESSOR

The B 900 series utilizes a multiprocessor architecture with the B 920 supporting up to eight high-speed 2 megahertz processor and the B 930 supporting up to eight 3MHz processors. Each processor independently executes instructions from its own associated memory. Also, each processor supports its share of the total processing environment in a multiprogramming mode. The breakdown of processor functions and each associated memory size follows:

- **The Operating System Processor manages the internal operations of the system; it contains and executes all the control routines associated with the Master Control Program (MCP), except for disk. This processor's memory provides data storage and data communications buffers as required for peripherals. The operating system processor is called upon by the other processors as the operating ▶**

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PERIPHERALS/TERMINALS

DEVICE	DESCRIPTION
TERMINALS	
AP310	90 cps remote journal printer with tear-off blade asynch/synch modem connect
AP380	90 cps remote passbook only printer
AP100	90 cps shared printer
AP150	90 cps shared printer with APR
AP1300	Letter Quality printer, receive only; TTY models, RS232C
AP1301	Letter Quality printer, receive only
MT1500	Shop Floor/Distribution Terminal
TD731	Input and display system includes 480-character SELF-SCAN II display/control, 2000-character display memory, 3000-character data comm buffer, Burroughs standard basic data communications procedures, and asynch data set/direct connect communications interface
TD732	Input and display system includes 480-character SELF-SCAN II display/control, 2000-character display memory, 3000-character data comm buffer, Burroughs standard basic data communications procedures, asynch data set/direct connect communications interface, and peripheral capable
TD733	Input and display system includes 480-character SELF-SCAN display/control, 2000-character display memory, 3000-character data comm buffer, Burroughs standard basic data communications procedures, and synchronous data set communications interface
TD734	Input and display system includes 480-character SELF-SCAN II display/control, 2000-character display memory, 3000-character data comm buffer, Burroughs standard basic data communications procedures, synchronous data set communications interface, and peripheral capable
TD015A	Alphanumeric Typewriter Keyboard
TD016	Data Preparation Keyboard
TD017	Ten-Key Auxiliary Keyboard (TD015 or TD016 required)
TD019	Alphanumeric keyboard with typewriter keyboard, numeric keypad, and special function keys
TD100	Expanded memory (expands TD730 and TD830 display memory from 2,000 characters to 4,000 characters and data comm buffer from 1,200 characters to 3,000 characters)
B9249-1	85 lpm, 132 print positions
B9249-2	160 lpm, 132 print positions
B9249-3	250 lpm, 132 print positions
B9498-11	10 ips, NRZ magnetic tape cassette
TD76	Cassette controller (includes one A 9490-25 drive)
TD078-1	Auxiliary magnetic card reader for TD015 keyboard
TP312	90 cps display printer
TD312-1	90 cps display printer with tear off blade
TT650-1	Logic and display unit; 26-keyboard, 150-character buffer, data set interface, Burroughs sync/asynch multipoint, MCR and P.I.N. potential
TT651-1	Logic and display unit; 26-key keyboard, 150-character buffer, direct connect, Burroughs asynch multipoint, MCR and P.I.N. potential
TT650-2	Logic and display unit; 30-key keyboard, 256-character buffer, data set interface, Burroughs sync/async multipoint, MCR and P.I.N. potential
TT651-2	Logic and display unit; 30-key keyboard, 256 character buffer, direct connect, Burroughs asynch multipoint, MCR and P.I.N. potential
TU1806	Teller terminal, alpha, keyboard
TU1807	Teller terminal, alpha, screen
TU1856	Teller terminal, alpha, APR
TU1857	Teller terminal, alpha, screen, APR
LINE PRINTERS	
B9249-375	375/500 lpm printer, 64/48 character set
B9349-1	85 lpm printer
B9349-2	160 lpm printer
B9349-3	250 lpm printer
B9349-4	350 lpm printer
B9251	Table-Top printer, 180-230 cps matrix printer
B9246-3	300 lpm band printer
B9246-6	600 lpm band printer
MP1200	Wide Line Printer Control
B9246-13	1250 lpm band printer
MAGNETIC TAPE	
B9491-4	40KB, 1600 bpi magnetic tape unit (9-channel PE)
B9498	Magnetic Tape Streamer
MP1491	Magnetic Tape Control
MP1498	B 900 Control for B 9498
CARD READERS	
B9114-1	200 cpm card reader (80-column)
B9115	300 cpm card reader (80-column)
B9116	600 cpm card reader (80-column)
A9362-2	Console/Reader/Feeder/Stacker
MP1115	B9115/6 card reader control

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▷ Burroughs offers a wide range of software products to facilitate the user of the B 900 in distributed networks. The B 920 supports RJE, HASP, 2780/3780, 3270, and SNA communications. These programs enable on-line applications to process concurrently with host communications.

COMPETITIVE POSITION

Burroughs has targeted the B 900 to compete in the multi-screen, multi-application system market. The responsiveness of the system, the inherent growth potential, and the redundancy capability are all positive aspects of the system as are the numerous applications software packages available from Burroughs. The B 900 Series is competitive with DEC's Datasystem Series, Prime's Information Series, Texas Instruments' Business Systems Series, and Wang's 2200 Series.

ADVANTAGES AND RESTRICTIONS

The B 900 provides an excellent growth path for the current B 90 series as well as the older B 700 and B 800 computers. Many B 700 and B 800 users can retain their existing peripheral equipment, such as disk drives and printers, to reduce their system's overall cost.

The multiple processor architecture on the B 900 allows Burroughs to provide a high level of system availability. The system design ensures minimum down-time. One task processor could fail entirely without impacting job execution on other processors. The jobs from the failed processor, however, would need to be restarted. Also, an optional processor redundancy feature offered by Burroughs provides backup for both the operating system processor and the disk file management processor.

These features extend the B 900's market applicability into those areas where system availability is key. Financial data applications, distributed inquiry/response functions, and stand-alone business systems each demand a certain level of system usage. This Burroughs offering maintains a more than acceptable level of system operation to provide the user maximum uptime for his system dollar.

USER REACTION

Datapro's 1983 User Survey received nine responses from Burrough's B 900 users. All the systems were B 920s with an average life span of approximately 24 months. Eight B 920s were purchased by the respondents and one was leased from the manufacturer. Two of the respondents were first-time computer users and the rest had converted from Burroughs' B 800 systems. The type of industry represented most in this survey was manufacturing (5 users), while the principal applications performed on the B 920s were Accounting/Billing, Order/Processing/Inventory Control, and Payroll/Personnel (each 8 users), followed by Sales/Distribution (6 users), and Manufacturing (5 users). The majority of application programs came from in-house personnel (8 users), followed by "packaged" programs from the manufacturer.

▶ system services are needed. It only addresses the other processors when control information is required. The operating system processor also controls the Time-of-Day Clock, the Operator-Display Terminal, and certain other peripherals. The basic system includes 256K bytes of memory for the operating system processor.

- The Disk File Management Processor provides a direct interface to the disk devices for file management. This processor and its associated memory stores and executes the physical disk access functions usually associated with the operating system. Disk data flows directly to and from buffer memory which is a part of memory associated with the operating system processor.

- Two Task Processors are included in the basic system. Each can operate in a multiprogramming mode under the management of the MCP. Each job is reviewed by the MCP in light of the system workload prior to assignment to a particular task processor. This results in an optimal system resources/system performance mix. The 512K bytes of memory associated with each task processor stores all user programs and user-oriented utilities during their period of execution. The interpreters, used to execute user programs, are also stored within each processors memory. All buffers reside within the operating system processor to free maximum memory for the execution of user programs and utilities.

- Two Data Communications Processors are also included in the basic system. Please refer to the Communications Control section of this report for further details on their operation.

The multiple processor architecture provides a high level of system availability. If a task processor fails, the jobs running in that processor will need to be restarted but will be allocated by the MCP to another processor. Jobs running on other than the failed processor will continue to execute.

An optional Processor Redundancy feature maintains the system if either the operating system processor or the disk file management processor should fail. The depression of a button on the system control panel will assign data task processor(s), at warm start, to take over the position of the operating system processor and/or the disk file management processor. Any task processors providing back-up for the operating systems processor must be configured with 256K bytes of memory.

CONTROL STORAGE: The 8KB ROM (read-only memory) contains cold and warm start code and a basic maintenance test routine.

REGISTERS: None apparent to users. Internal registers include registers for storage protection, temporary storage areas for data being manipulated by the microprogram and the special-purpose Memory Address Register (MAR), Micro Memory Address Register (μMAR), and Timing Machine State (TMS) registers. The base and limit registers are used for storage protection, defining the space that may be utilized by the user within user data segments of memory. The MAR register is used to address those main memory locations from which data is to be read or written, while the μMAR register addresses the portion of main memory from which microinstructions are read, and the TMS registers determine the period of time when a microinstruction remains active. Together, these registers control the timing of all processor operations.

INTERRUPTS: Both external and internal interrupts are present in the B 900. Internal interrupts can occur on a memory parity error, when the Clear button is depressed, or ▶

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B 900 SPECIFICATIONS

MODEL	Burroughs B 920	Burroughs B 930
WORD LENGTH, BITS	64	64
CPU		
Model	B 900-2	B 930-1, B 930-2
Add time, microseconds	—	—
No. of I/O ports on basic sys. and max.	—	—
INTERNAL STORAGE		
Type	MOS	MOS
Capacity of basic system, bytes	640K	576K
Maximum capacity, bytes	1.5M	3200K
Increment size, bytes	64K, 128K	64K
Cycle/access time, microseconds	1.0/0.5	0.33
MASS STORAGE		
Floppy disk (diskette) drive	Opt.; 1M or 6M bytes	Opt.; 1M or 6MB
Maximum diskette storage	10M bytes	10M bytes
Cartridge disk drive	Opt.; (3) 9.2M bytes	Opt.; (3) 92MB
Pack disk drive	Opt.; 390M bytes	Opt.; 520MB
Fixed-head disk/drum	231M bytes	—
Maximum disk storage	550M bytes	1,768M bytes
INPUT/OUTPUT DEVICES		
Serial printer	Opt.; 120 cps	Opt.; 230 cps
Line printer	Opt.; 250-600 lpm	Opt.; 250-1200 lpm
Reel-to-reel tape drive	Opt.; 40K bytes	Opt.; 40K
Cassette/cartridge tape drive	Opt.; 1KBS/No	Opt.; 1KBS/No
CRT	Optional	Optional
COMMUNICATIONS		
Maximum no. of lines	4	18
Synchronous	Opt.; to 9600 bps	Opt.; 9600 bps
Asynchronous	Opt.; to 1800 bps	Opt.; 9600 bps
Protocols supported	BDLC, Bisync	2780/3780, BDLC
Network architecture supported	Async, Sync	—
RJE terminals emulated	—	Yes
IBM 3270 emulation	—	Yes
SOFTWARE SUPPORT		
Cobol	Yes	Yes
RPG	Yes	Yes
Fortran	No	No
Basic	No	No
Assembler	No	No
Other programming languages	NDL, MPL II	NDL/MPL II
Multiprogramming	Yes	Yes
Max. no of jobs run concurrently	—	25
Language complemented in firmware	Fully	Fully
Op. sys. implemented in firmware	Fully	Fully
General accounting packages	Yes	Yes
Industry application areas	General-purpose	Business accounting
Data base management system	No	No

▷ The number of workstation/terminals used on-site averaged between five and thirteen. Remote workstation/terminals averaged between three and nine per user (although four users had no remote hookups). Memory capacities averaged between 640KB to 1,280K, and total disk storage capacities averaged between 70MB to 186MB. Only one user employed a data base management system (the manufacturer's package); and another had integrated word processing functions. The programming language used most on the B 920s was Cobol (8 users), while three users employed a disaster recovery program. When asked if they intended to replace their systems in 1983, all the users said ▷

▶ when power is first connected to the system. External interrupts occur when a peripheral device requests attention (active data movement operation required). The B 900 uses an automatic hardware interrupt system, the individual I/O channel notifies the processor when data is ready for processing or transmission.

PHYSICAL SPECIFICATIONS: The multiple processors used in the B 900 system are housed in a single cabinet. The memory associated with each processor, the time-of-day interfaces are also housed in the same cabinet. This one cabinet is also used to house the integral version of the Burroughs Super Mini Disk unit. The processor cabinet is 44 inches high, 29 inches deep, and 23 inches wide. The weight of the cabinet is 375 pounds (domestic version). ▶

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▷ no. The nine Burroughs' B 900 Series users rated their computers as shown in the table below.

	Excellent	Good	Fair	Poor	WA*
Ease of operation	7	1	1	0	3.6
Reliability of mainframe	5	4	0	0	3.5
Reliability of peripherals	3	4	1	0	3.2
Maintenance service:					
Responsiveness	4	5	0	0	3.4
Effectiveness	4	4	1	0	3.3
Technical support:					
Trouble-shooting	3	2	2	2	2.6
Education	0	4	3	2	2.2
Documentation	0	4	1	4	2.0
Manufacturers software:					
Operating system	4	3	2	0	3.2
Compiler & assemblers	2	7	0	0	3.2
Application programs	0	2	2	2	2.0
Ease of programming	2	4	1	0	3.1
Ease of conversion	3	3	1	0	3.2
Overall satisfaction	2	5	2	0	3.0

*Weighted Average on a scale of 4.0 for Excellent.

When asked to state the significant advantages of the system, seven users said they were happy with response times, six users stated that the system was easy to expand/ reconfigure, and four said that productivity aids helped them keep programming costs down, that delivery and/or installation of equipment was ahead of schedule, and that programs/data carried over from other systems are compatible as the vendor promised. Two users chose not to respond. On the negative side, however, three users each stated that the installation of equipment was late and that the delivery of required software was late. Four users did not respond in this category.

When questioned as to whether their computer systems did what they expected them to do, eight users said yes. Similarly, when asked if they would recommend the system to another user, seven said yes and two said no. □

▶ Power requirements for the U.S.A. are 120 VAC + 10 percent, -15 percent, at 60 Hertz. The systems requires 1.7 KVA. The operating environment is from 55 to 104 degrees F., with a humidity tolerance ranging from 20 to 85 percent, noncondensing. Additional air conditioning above normal office levels is not required except in extreme operating environments. The processor cabinet and contents dissipate about a maximum of 5100 BTUs of heat per hour. Service area and general machine requirements indicate the need for a floor area with about a three foot clearance around the system. Models to satisfy all international requirements are also available.

INPUT/OUTPUT CONTROL

I/O CHANNELS: The Operating System Processor contains and executes all of the control programs associated with the Master Control Program (MCP)—except for disk activities. The MCP handles all physical I/O operations and controls the operation of I/O devices. These activities include:

• Shared files

• Printer back-up

• Index file handling

• Locating files

• Data transfer

• Buffer management

• Automatic label recognition

• Error monitoring

• Automatic retry on error detection

These functions are handled directly by the MCP, program logic for these functions does not have to be included in user programs. This simplifies writing application programs and reduces program size.

SIMULTANEOUS OPERATIONS: Each of the B 900 separate processors includes its own memory in order to perform its specialized functions. All processors spend the majority of their time accessing their own associated memory. A memory interface bus (MIB) allows for exchange of information as required. More than one program may be run concurrently within designated processors. The MCP controls automatic multiprogramming by assuring efficient use of each processor on one program while I/O is occurring for other programs.

CONFIGURATION RULES

Maximum configuration parameters for the B 900 series are as follows:

• Up to 3.3 megabytes of main memory

• Up to 1700 megabytes of disk storage

• Up to 36 workstations recommended

• Up to four magnetic tape drives

• Up to two line printers

WORKSTATIONS: A wide range of Burroughs terminals, terminal displays, and workstations are currently available for the B 900. There is a particular emphasis on products designed for the financial community. It is difficult to determine the exact number of terminals supported by the B 900 as both the terminal type, job mix, and system configuration all impact the total applicable system response times. The B 900 is physically capable of supporting up to twelve in-built lines with two having a 38,400 bit-per-second bandpass. Total bandpass fo all twelve lines may be up to 96,000 bits per second. The second optional DCP provides up to 192,000 bit-per-second total bandpass for all twelve lines. Each 38,400 bit-per-second line can typically handle nine asynchronous local terminals. An Operator-Display Terminal (ODT), used for communication with the MCP and for monitoring system resources, is mandatory on the B 900.

DISK STORAGE: A board range of fixed and removable disk storage subsystems is available with the B 900. The system will support up to four disk host controls through the Disk File Management Processor. At least one unit must be a removable device and be designated as System Loader. This is required for coldstart and maintenance procedures. In addition to the four disk controls described above, the industry-compatible mini-disk can be attached to the peripheral subsystem through the operating system processor. ▶

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► MAGNETIC TAPE: The B 900 supports two different types of nine-track, phase-encoded magnetic tape units. The transfer rate and a 25 inches per second read/write speed. The second unit offers two speeds of operation: 100 inches per second for data streaming applications and 25 inches per second for normal read/write operations. Up to four magnetic tape drives can be controlled under MCP.

PRINTERS: A minimum of one and a maximum of two line printers can be configured in the B 900. This provides a total output print capacity ranging from 160 lines per minute to 1200 lines per minute.

MASS STORAGE

BURROUGHS SUPER MINI-DISK (BSM I & II) DRIVES: These floppy disk drives are available either built into the processor cabinet and/or a free-standing units. The BSM sybsystem consists of a controller with 200-character buffer 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 sets of read/write heads. The BSM I drive is capable of storing one million bytes per diskette (500,000 bytes per side.) Each diskette contains 180 bytes per sector, 32 sectors per track, and 88 tracks per side. Track density is 64 tracks per inch, with a track-to-track access time of 20 milliseconds per single step and a setting time of 80 milliseconds. Average sccess time is 266 millisecond, and the data transfer rate is 45K bytes per second.

The BSM II drive is capable of storing three million bytes per diskette (1,500,000 bytes per side). The system offered is an inbuilt dual diskette unit with 6 megabytes of storage. Each diskette contains 180 bytes per sector, 59 sectors per track, and 1142 tracks per side. Track density is 150 tracks per inch, with a track to track access time of 38 milliseconds per single step including a settling time. Average access time is 157 milliseconds and the data transfer rate is 125K bytes per second. BSM I and II are manufactured by Burroughs.

B 9489-17 INDUSTRY-COMPATIBLE MINI-DISK (ICMD) DRIVE: These floppy disk drives are available only as free-standing units. The ICMD subsystem uses a controller similar to the one used in the BSM subsystem. A subsystem is composed of a controller and a single ICMD drive. Unlike the BSM drive, the ICMD drive reads only one side of the diskette. Each diskette stores 243K bytes of data with 128 bytes per sector, 26 sectors per track, and 77 tracks per diskette, including three alternates. Track-to-track access time is 20 milliseconds per single step, and settling time is 10 milliseconds. Average access time is 343 milliseconds, and the data trasfer rate is 31K bytes per second. The ICMD is manufactured by Burroughs under license from CDC.

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

Model	Capacity, bytes	Avg. Access Time
9480-22	4.6 million	146 milliseconds
9481-12	9.2 million	100 milliseconds
9480-12	4.6 million	80 milliseconds

Each drive accommodates one disk cartridge and has two read/write heads, on 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 193K bytes per second. The 9481-12 average rotational delay of 20 milliseconds, and a data transfer rate of 193K bytes per second. The 9480-12 has an average head positioning time of 60 milliseconds, an average rotational delay of 20 milliseconds, and a data transfer rate of 193K bytes per second. The B 9480/B 9481 subsystem is manufactured by Burroughs.

B 9493/9494 FIXED-DISK DRIVES: Four models of fixed-disk drives are available for use with the B 900:

Model	Capacity, bytes	Avg. Access Time
B 9494-40	38.6 million	55 milliseconds
B 9493-80	77.2 million	55 milliseconds
B 9494-18	18.8 million	55 milliseconds
B 9493-37	37.6 million	55 milliseconds

The 9493-37 and -80 use a Winchester-style fixed-disk drive with four 14-inch aluminum disks with two read/write heads per surface in a sealed unit. The recording density is 5550 bits per inch with 300 tracks per inch. The transfer rate is 888K bytes per second.

DISK PACK SUBSYSTEMS: Each B 9484 drive houses two removable packs of five platters each. The B 9484 is available in either a 65- or 130-megabytes version. The average access time is 33 milliseconds, average rotational delay is 8.3 milliseconds, and data transfer rate is 605K bytes per second. The required B 9387-41 Disk Pack Drive Controller supports up to three drives (six spindles). A system loader disk device, which could be either a disk cartridge of a Burrough Super Mini-Disk, is also required. A disk pack cannot be used as the system loader device.

INPUT/OUTPUT UNITS

Burroughs product development policy is such that all terminals and peripherals should be compatible with all processor models. The B 900, then, supports a wide range of peripherals and terminals. The report details only those currently in production.

See Peripherals/Terminals table for units other than the AE systems and Direct Entry Systems 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 Mini-disks 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 three audit entry data preparation system models offered by Burroughs. The AE501 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.

All AE systems include a 28K processor, implemented in large- and medium-scale integrated circuits. Data movement ►

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

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

The basic AE 511 and AE 513 include the 60-cps matrix printer and a Burroughs Self-Scan 240-character visual display panel. 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 lines.

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. 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.

DIRECT DATA ENTRY: Burroughs direct data entry systems are designed to provide a variety of users with the ability to directly enter and/or retrieve information from the central system, as and when required, without leaving the user departments. Direct data entry systems can be configured with the B 900 processors utilizing Burroughs MT983 visual display units connected either directly or via data sets. These systems can use the Burroughs Terminal Entry software (TE1) and the Burroughs text editor (WMS). The Terminal Entry software (TE1) is a completely generative program product used to format input procedures to fit internal documents and to format output files to be used by application programs. This provides the user with the ability to interface with Burroughs standard program products.

COMMUNICATIONS CONTROL

The B 900 series uses a separate data communications processor (DCP) to interface terminals and workstations. The processor and its associated 64K bytes of memory execute the network as defined by the Burroughs Network Definition Language (NDL). Multiple workstations can be used either locally or at remote sites to support concurrent real-time transaction processing. The DCP can handle up to twelve communications lines of varying types and speeds with a total bandpass of 96,000 bits per second and a maximum line speed of 38,400 bits per second. A second DCP can be added to the basic system to increase the total bandpass to 192,000 gits per second without increasing the number of lines. This would allow twelve lines to run at the maximum line speed of 38,400 bits per second. Each B 900 data communications line and its associated characteristics are outlined below.

Line Discipline	Line Distance	Maximum Line Speed
Asynchronous Modem Connect	No restriction	1,800 bps
Asynchronous Direct Connect (TDI)	250 Feet 500 Feet 1,000 Feet	38,400 bps 19,200 bps 9,600 bps
Synchronous/ Bisynchronous Modem Connect	No restriction	9,600 bps
BDLC Modem Connect	No restriction	9,600 bps

Burroughs Network Definition Language (NDL) provides the means to generate a network controller program. This includes the physical connection of terminals and workstations to the B 900. The number of lines, type of terminal, line speeds, modems, and remote or local links required are defined through NDL. Changing terminal locations or installing additional workstations can be easily implemented through NDL.

Burroughs provides a series of program products to ease the connection between B 920 systems and other host mainframes, either from Burroughs or other vendors. This is key to the use of the B 920 in a distributed processing environment with on-line application processing concurrent with host communications. Current distributed processing software products include:

• Burroughs Remote Job Entry (RJE)

• Burroughs System Communication Module (SYCOM)

• IBM HASP Remote Job entry

• IBM 2780/3780 Look-alike Remote Terminal Program EIBM 3270 Line Protocol Remote Terminal Program

• IBM Systems Network Architecture (SNA) Interface

SOFTWARE

The Burroughs Computer Management System (CMS) integrates the complete line of Burroughs Small Business Computers. CMS programs are object code compatible and will run on similarly configured B 80, B 90, B 800, B 900, B 1800 and B 1900 systems with no reprogramming. Console-based programs are not portable to the B 920. The CMS approach covers the entire system of computer software. It incorporates:

• Master Control Program (MCP)

• Utilities

• Interactive Development Aids

• On-Line Programming ➤

Burroughs B 900 Series

▶ • High-Level Languages and Generative Aids

• Distributed Processing Software

• Conversion Aids

• Business Management Systems

OPERATING SYSTEMS: The Master Control Program (MCP) operating system simplifies the operation and control of the system. The MCP provides two-way communications between the operator and the system in easy-to-understand statements. The system control notifies the operator of missing data, errors, start and end of jobs, and special conditions. The status of all active jobs is provided or request.

In order to fully utilize the features of the multiprocessor architecture on the B 900, the MCP provides the capability of concurrent multiprogramming in each task processor available on the system. The B 900 MCP allocates jobs to task processors depending on the system's workload. Peripheral units are assigned as needed to meet I/0 requirements. Memory and processor usage are allocated by the appropriate task processor. Optimum system efficiency and throughput are achieved, in part, due to the B 900 dynamic resource allocation. Processors, memory, peripherals, disk storage, and program priorities are inventoried and assigned to meet job requirements. The MCP automatically recognizes new system configurations to allow the user a hardware growth path without reprogramming constraints.

The B 900 MCP provides for a virtual memory system to enable the B 900 to run programs larger than the available memory size. This enables the MCP to maximize memory utilization to insure a multiprogramming/multiprocessing environment.

The B 900 MCP includes the CMS Shared Files feature to allow multiple update programs concurrent access to the same file or group of files. Two or more programs can concurrently update a file while multiple inquiry programs access the file. Locking and unlocking blocks of data avoids data corruption caused by simultaneous updating of the same data. This assures that programs receive up-to-date records in light of other programs adding, changing, or deleting file records. Shared files are supported on the B 900 in COBOL, RPG, and MPL. This feature applies to both indexed and sequential files.

The B 900 and MCP offer a printer back-up option to avoid a system stoppage caused by several programs simultaneously requesting one printer. The printer back-up option automatically diverts printer files to disk if no printer is available. Also, if the option is set to "Auto," the file will be printed without any operator action as soon as a printer becomes available. The printer back-up option also provides the following features: selective printing of parts of a file, printing multiple copies automatically (up to 99 copies), saving the back-up file to provide restart capabilities, and sequencing print jobs to minimize paper changes.

The B 900 provides a contiguous fixed disk feature that allows a fixed-disk unit or series of fixed-disk units with multiple platters to be treated as one large continuous disk instead of several small ones. Several advantages are accrued by this approach including optimization of head movement to provide greater throughput, efficient storage of large files, and simpler disk management cosiderations.

Logging is an important feature of the MCP. The System Log acts as a diary of all system events which occurred since the previous log was printed. This provides a permanent record for future reference. The current log can be displayed and printed as required. The Maintenance Log records the performance of the B 900 hardware and peripherals. This may be used to highlight potential faults in a device before a hard failure.

The B 900 MCP provides automatic multiprogramming to run segments of multiple programs concurrently. The MCP automatically allocates memory areas, initiates I/O operations, provides automatic error handling procedures, and allocates resources according to program priorities. MCP automates may programming operations such as: memory allocation loading routines, file opening and closing, input/output procedures, indexed file handling, program library calls, error handling, and other "housekeeping" functions.

LANGUAGES: MCP accepts source programs in COBOL, RPG, NDL, and MPL II. High-level languages provide portability of application programs between CMS systems. All CMS systems support the same high-level languages and use the same compilers to generate common executable obect code. NDL was discussed in the Communications Control section of this report.

CMS COBOL is a subset of ANSI '74 COBOL. Several extensions developed by Burroughs take advantage of CMS system software and hardware capabilities. These include: shared files, interface to console printers and displays, and file attributes.

CMS RPG is a standard implementation of RPG with some extensions for use in a CMS environment. These RPG extensions provide the following functions: shared files, interface to console printers and displays, and file attributes.

GEMCOS is Burroughs' Generalized Message Control System. It works with NDL to provide the link between a terminals user and an application program. GEMCOS is used to generate a Message Control System (MCS) with the following functions: (1) restrict the access of users only to programs which they are qualified to run, (2) route messages between terminals and applicatons, (3) record all messages for use at a later time if recovery is required.

CMS Message Processing Language (MPL II) is a high-level language designed for the development of specialized on-line applications. This language is typically used to generate a unique Message Control System (MCS) where GEMCOS either does not provide a specific network function or when MCS requirements need to be extremely defined to a specialized task.

UTILITIES: A wide range of utilities are available for the B 900. Common CMS utilities include sorts, file dump, file load, file lists, directory maintenance, and media conversion. A new version of CONFIGURER is available on the B 900 to provide facilities to assign resources specific to a multiprocessor system.

The *CMS Automatic Run Control System (ARCS)* enables automatic execution of predefined sequences of commands and programs of a repetitive nature from a single statement. ARCS is used to sequence back-up routines, batch-file updates, print routines and compilations, and help provide for unattended system operation.

An *On-Line REPORTER* is available to generate customized reports on the B 900. Users without a computer background can define reports interactively from a workstation, extract required information from a data file, and immediately print it. The report can also be stored on disk for future inquiry. This eliminates the need for multiple distribution of large reports with their inherent storage and handling prob- ▶

Burroughs B 900 Series

▶ lems. On-Line REPORTER provides the following capabilities:

- Data selection based on record type, range of records, conditions, or run-time supplied data

- Report formatting

- Conditions

- Statistical and summary information

DOMAIN provides a simple method of developing custom inquiry and file maintenance programs. DOMAIN is an interactive tool to define specialized inquiry and file maintenance requirements. It allows the user to inquire into records on a disk file, to create a disk file, and to add, delete, and maintain records on a disk file.

CANDE is an interactive system used to create and update source and data files through a simple but powerful set of editing commands. CANDE enables the initiation of compiles and other operating system commands. On-Line programming with CANDE will support multiple users concurrent with the execution of other applications and development aids.

RPG EDIT provides the main features of CANDE except that it is designed specifically for the RPG programming language. RPG Edit allows interactive prompting and editing of RPG specifications. This results in a faster turnaround time on RPG program development.

ODESY feature include:

- Data Entry prompted by screen formats customized for the users needs.

- Data audit and verification.

- Interactive existence checking on indexed files.

- Masterfile data retrieval via user written inquiry program interface.

- Reformatting of data before output.

- Statistical reporting.

- Optional formatted journal listing.

APPLICATION SOFTWARE: An MCS and NDL defined controller are a requirement of all application systems. These controllers are available with most Burroughs screen-based programs in a pre-defined form.

Burroughs Library of Program Products includes Business Management Systems and specialized application program products. Burroughs program products are available for wholesalers, utilities, contractors, manufacturers, hospitals, government, financial institutions, and other major areas of small business computer applications. Software and application program products are separately licensed and priced.

PRICING

POLICY: Burroughs offers the B 900 systems for either purchase or lease. In addition to the standard one-year lease, Burroughs offers three-year and five-year plans at an approximate discount of five percent for each additional year.

The Burroughs equipment lease agreement includes equipment maintenance based on use of the equipment during one eight-hour period per day. Additional extra-shift charges are billable for maintenance coverage on a 24-hour/day, 7-day/week plan.

EQUIPMENT: The components and prices of the packaged B 900 systems are listed in the EQUIPMENT PRICES section, which follows. The maintenance prices shown are based on an annual maintenance billing.

EQUIPMENT PRICES

		Purchase Price	Annual Maint.	1-Year Lease	3-5 Year Lease
PACKAGED SYSTEMS					
B920-SYS	B 920-SYS System includes B 920 CP processor cabinet with time of day clock, internal timer, five 2MHz processors, four 128KB memory modules, one 64KB memory module, and one 32KB memory module	22,559	—	857	814
B 930-SY1	B 930 Model 1 System includes B 930-1 processor cabinet with time of day clock, 64KB PRAM memory, four 3MHz processors, two 256KB memory modules, one 64KB memory module, and two data comm I/O extender cables	23,228	—	1,009	841
B 930-SY2	B 930 Model 2 System includes B 930-2 processor cabinet with time of day clock, 64KB PRAM memory, five 3MHz processors, three 256KB memory modules, one 64KB memory module, two data comm I/O extender cables, extended backplane, redundancy kit, B 930 disk file cache module, 256KB memory for DFCM	33,000	—	1,400	1,233
PROCESSORS					
B 900-2	2MHz processor (B920)	1,575	—	103	83
B 900-3	3MHz processor (B930)	1,750	—	73	63
MEMORY					
BD 4064-2	64KB memory module (B920)	750	—	27	24
BD 4064-3	64KB memory module (B930)	750	—	31	27
BD 4128-2	128KB memory module (B920)	1,575	—	53	47
BD 4256-3	256KB memory module (B930)	1,750	—	73	63
BD 4512-3	512KB memory module (B930)	3,000	—	125	108 ▶

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▶ **EQUIPMENT PRICES (cont.)**

		Purchase Price	Annual Maint.	1-Year Lease	3-5 Year Lease
REDUNDANCY KITS					
MP1180-B	105M PROM1 Kit (Cartridge)	1,500	—	87	82
MP1189-E	105M PROM3 Kit (3/6 BSMC)	1,500	—	87	82
MP1184-F	105M PROM4 Kit (1MB BSMC)	1,500	—	87	82
MP1190	B930 Redundancy Kit	1,750	—	73	63
EXTENDED BACKPLANE					
MP1150	B930 Backplane	1,272	—	22	19
ODT and CONTROL					
MP1361	ODT Control	630	53	22	19
MP9361-2	Operator Display Terminal (MT983)	2,620	NC	131	126
MASS STORAGE					
B9489-1	1.0MB Super Mini-Disk drive	956	32.20	41	35
B9489-17	243KB IC Mini-Disk drive, freestanding	2,100	31.10	105	95
B9489-21	3/6 Inbuilt	3,150	43.00	196	176
B9480-22	4.6MB, 145 MS cartridge disk drive	4,000	105.00	196	176
B9481-12	9.2MB, 100 MS cartridge disk drive	7,500	152.00	395	356
B9494-18	18.8MB fixed disk	5,775	83.50	292	263
B9493-37	37.6MB fixed disk	8,925	102.00	510	483
B9493-20	19.3MB fixed disk	9,975	64.20	389	350
B9494-40	38.7MB fixed disk	12,600	86.60	531	504
B9493-80	77.0MB fixed disk	15,225	103.00	623	560
B9493-9K	9MB to 18MB Upgrade Kit	1,050	8.67	45	33
B9493-40K	40MB to 80MB Upgrade Kit	3,676	14.58	98	88
B9487-11	Disk Storage/Single Controller (65.2MB)	38,271	165.00	1,286	1,059
B9487-12	Disk Storage/Single Controller (130.4MB)	51,247	165.00	1,740	1,506
B9484-51	130.4MB Disk Pack Increment	21,000	122.00	776	711
MP1480-B	Disk Loader B (cartridge/B920)	893	—	30	26
MP1484-F	Disk Loader F (1MB BSMD/B920)	893	—	30	26
MP1489-E	Disk Loader E (3/6 BSMD/B920)	893	—	30	26
MP1417	ICMD Control	918	—	31	27
MP1436	3/6 Retrofit Kit	1,864	—	62	61
MP1480	Disk control for 1MB BSMD/cartridge/18/37MB fixed disk	918	—	31	27
MP1484	Disk Pack Control	1,155	—	39	37
MP1493	Disk Control for 3/6MB BSMD and 40/80MB fixed disk	918	—	31	27
B9468-2	256KB disk file cache module (B920)	8,400	—	323	307
MP1421	Disk Loader Cable E (3/6 BSMD/B930)	332	—	16	15
MP1422	Disk Loader Cable A (1MB BSMD/B930)	332	—	16	15
MP1424	Disk Loader Cable B (Cartridge/B930)	332	—	16	15
B9387-41	B9387-11/12, B9494-41 Controller	42,000	—	1,360	1,279
B9494-41	402MB fixed disk drive	25,200	1,134.00	847	781
B9468-3	B930 disk file cache module	3,250	312.00	136	117
MAGNETIC TAPE					
B9491-4	40KB, 1600 bpi magnetic tape unit (9-channel PE)	13,231	84.60	513	436
B9498	Magnetic Tape Streamer	7,875	37.50	290	261
MP1491	Magnetic Tape Control	2,410	—	81	77
MP1498	B 900 Control for B 9498	1,360	—	89	80
LINE PRINTERS					
B9249-375	375/500 lpm printer, 64/48 character set	8,915	91.70	379	331
B9349-1	85 lpm printer	2,500	61.90	158	142
B9349-2	160 lpm printer	4,500	80.70	234	210
B9349-3	250 lpm printer	5,500	90.80	311	280
B9349-4	350 lpm printer	6,500	101.00	428	385
B9251	Table-Top printer, 180-230 cps matrix printer	3,487	33.00	117	105
B9246-3	300 lpm band printer	12,076	137.00	440	395
B9246-6	600 lpm band printer	14,701	182.00	551	475
MP1200	Wide Line Printer Control	635	—	22	18
B9246-13	1250 lpm band printer	42,500	5,040.00	1,635	1,470 ▶

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▶ **EQUIPMENT PRICES (cont.)**

		Purchase Price	Annual Maint.	1-Year Lease	3-5 Year Lease
CARD READERS					
B9114-1	200 cpm card reader (80-column)	2,090	43.30	89	84
B9115	300 cpm card reader (80-column)	8,608	61.60	316	284
B9116	600 cpm card reader (80-column)	11,372	86.40	421	379
A9362-2	Console/Reader/Feeder/Stacker	3,235	29.60	93	88
MP1115	B9115/6 card reader control	630	—	23	20
DATA COMMUNICATIONS					
MP2001	Data Communications Interface (DCI)	788	—	27	26
MP2002	Data Communications Interface (BLDC)	1,085	—	35	34
MP2005	Line Adapter II	788	—	27	26
MP2006	Second DCP Kit	266	—	8	7
MP2009	Line Adapter 2 Kit (DL4)	284	—	11	10
MP2160-2	Direct Connect Kit (LA2)	53	—	3	3
NO2010	Second DCP Kit (DL5)	630	—	24	20
MP2012	Additional DCP Kit (B930)	725	48	31	26
MP2011	LEU-DCP Interface Kit	484	40	18	16
TERMINALS					
AP310	90 cps remote journal printer with tear-off blade asynch/synch modem connect	1,895	—	97	95
AP380	90 cps remote passbook only printer	4,715	—	197	191
AP100	90 cps shared printer	5,408	—	206	200
AP150	90 cps shared printer with APR	6,489	—	244	237
AP1300	Letter Quality printer, receive only; TTY models, RS232C	4,568	—	190	184
AP1301	Letter Quality printer, receive only	4,568	—	190	184
MT1500	Shop Floor/Distribution Terminal	3,676	—	123	120
TD731	Input and display system includes 480-character SELF-SCAN II display/control, 2000-character display memory, 3000-character data comm buffer, Burroughs standard basic data communications procedures, and asynch data set/direct connect communications interface	1,500	—	126	122
TD732	Input and display system includes 480-character SELF-SCAN II display/control, 2000 character display memory, 3000-character data comm buffer, Burroughs standard basic data communications procedures, asynch data set/direct connect communications interface, and peripheral capable	1,500	—	137	133
TD733	Input and display system includes 480-character SELF-SCAN display/control, 2000-character display memory, 3000-character data comm buffer, Burroughs standard basic data communications procedures, and synchronous data set communications interface	1,500	—	126	122
TD734	Input and display system includes 480-character SELF-SCAN II display/control, 2000-character display memory, 3000-character data comm buffer, Burroughs standard basic data communications procedures, synchronous data set communications interface, and peripheral capable	1,500	—	137	133
TD015A	Alphanumeric Typewriter Keyboard	298	—	14	14
TD016	Data Preparation Keyboard	298	—	14	14
TD017	Ten-Key Auxiliary Keyboard (TD015 or TD016 required)	195	—	8	8
TD019	Alphanumeric keyboard with typewriter keyboard, numeric keypad, and special function keys	758	—	33	32
TD100	Expanded memory (expands TD730 and TD830 display memory from 2,000 characters to 4,000 characters and data comm buffer from 1,200 characters to 3,000 characters)	541	—	23	22
B9249-1	85 lpm, 132 print positions	9,193	—	352	307
B9249-2	160 lpm, 132 print positions	6,290	—	234	221
B9249-3	250 lpm, 132 print positions	8,390	—	311	293
B9497-11	10 ips, NRZ magnetic tape cassette	1,774	—	67	59
TD76	Cassette controller (includes one A 9490-25 drive)	3,418	—	111	108
TD078-1	Auxiliary magnetic card reader for TD015 keyboard	1,323	—	45	44
TP312	90 cps display printer	1,500	—	97	95
TD312-1	90 cps display printer with tear off blade	1,500	—	97	95
TT650-1	Logic and display unit; 26-key keyboard, 150-character buffer, data set interface, Burroughs sync/asynch multipoint, MCR and P.I.N. potential	1,045	—	54	52
TT651-1	Logic and display unit; 26-key keyboard; 150-character buffer, direct connect, Burroughs asynch multipoint, MCR and P.I.N. potential	1,045	—	54	52
TT650-2	Logic and display unit; 30-key keyboard, 256-character buffer, data set interface, Burroughs sync/async multipoint, MCR and P.I.N. potential	1,134	—	56	54
TT651-2	Logic and display unit; 30-key keyboard, 256-character buffer, direct connect, Burroughs asynch multipoint, MCR and P.I.N. potential	1,134	—	56	54
TU1806	Teller terminal, alpha, keyboard	8,495	—	352	342
TU1807	Teller terminal, alpha, screen	10,700	—	489	474
TU1856	Teller terminal, alpha, APR	9,702	—	413	401 ▶
TU1857	Teller terminal, alpha, screen, APR				

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SOFTWARE

	Initial Payment	12 Mo. Payment	Annual License Fee	Monthly License Fee
SYSTEM SOFTWARE				
CM900 COB Cobol Compiler	1,825	175	347	65
CM900 RPG RPG Compiler	1,375	132	261	49
CM900 NDL Network Definition Language Compiler	900	—	90	50
CM900 MPL Message Processing Language Compiler	900	—	90	50
CM900 UTL Utilities	540	—	54	15
CM900 KIT Data Communications Installation Tool	NA	NA	NA	NA
CM900 MCP Computer Management System	2,500	—	250	100
CM900 RJE Burroughs standard	550	53	105	20
CM900 SYC SYCOM	750	72	143	27
CM9500 RNS Remote Network Services (including BDLC Station Group)	NA	NA	NA	100
CM9500 B25 X.25 Station Group (requires CM9500 RNS)	NA	NA	NA	50
CM900 HSP IBM 360-20 HASP RJE	825	79	157	30
CM900 R37 IBM 2780/3780 Look-Alike	825	79	157	30
CM900 R32 IBM 3270 Protocol	825	79	157	30
CM900 SNA IBM SNA Interface	1,950	187	371	70
DEVELOPMENT AIDS				
CM900 RPO On-Line REPORTER	2,710	260	109	113
CM900 DOM DOMAIN	1,885	181	76	79
CM900 AEU Audit Entry Host Utility	490	47	20	21
CM900 INQ CMS Inquiry	810	78	33	34
CM900 TE1 Terminal Entry for B900 TDS Control MCS, CANDE and ODESY	1,345	129	54	57
CM900 GMB GEMCOS (Basic Module)	700	68	28	30
CM900 GMT GEMCOS (TCL Compiler Module)	750	72	30	32
CM900 GMF GEMCOS (Formatting Module)	500	48	20	21
CM900 GMC GEMCOS (Complete System)	2,495	240	100	104
CONVERSION AIDS				
CS900 SL9 B700 SL7 Cobol to B900 CMS Cobol	585	56	0	NA
CM900 CON IBM System/32 to B 900 Conversion	600	58	0	NA
OFFICE AUTOMATION				
B900 WMS Word Management System	3,050	293	122	128
B900 OSR OMS-Shared Resource	1,500	144	165	63
B900 OEM OMS-Electric Mail	3,000	288	330	125
B900 OPT OMS-Productivity Tools	3,000	288	330	125
B900 ODP OMS-DP Interface	750	72	83	32
FINANCIAL SYSTEMS				
B900 FGL Financial General Ledger	1,885	181	76	79
BANK BUSINESS MANAGEMENT SYSTEM				
B900 B02 Bank Business Management System includes Application Program products for BK2, BD2, BC2, BS2, GL2, FG1	15,810	1,516	633	659
B900 BD2 Demand Deposit Accounting (NOW)	3,960	380	159	165
B900 BS2 Savings Deposit Accounting	2,440	234	98	102
B900 BC2 Certificates of Deposit (Money Market)	2,940	282	118	123
B900 BL2 Loan Accounting	4,330	415	174	181
B900 BK2 Audit Entry Proof	1,885	181	76	69
B900 BQ2 Central Information System Inquiry Module	2,710	260	109	113
B900 BU2 Central Information System Update Module	5,735	550	230	239
B900 BP2 Central Information System Reporting Module	1,615	155	65	68
B900 RDP Remote Data Processing	1,400	135	56	59
SAVINGS AND LOAN SYSTEM				
B900 TSL CMS Thrift Time Deposit/Loans Systems	20,000	1,917	800	834
B900 NOW CMS Thrift NOW/Demand Deposit Subsystem	4,330	415	174	181

Burroughs B 900 Series

		Initial Payment	12 Mo. Payment	Annual License Fee	Monthly License Fee
CREDIT UNION SYSTEM					
B900 CUS	Credit Union System includes CSL, CCL, BCP, CRP	7,895	757	316	329
B900 CUI	Inquiry/File Maintenance	4,330	415	174	181
B900 CUO	Update Module	6,275	602	251	262
B900 CSL	CMS C.U. Share/Loan	3,250	312	130	136
B900 CCL	CMS C.U. Club Module	1,885	181	76	79
B900 CBP	CMS C.U. Bill Payments	1,345	129	54	57
B900 CRP	CMS C.U. Extended Reporting Module	1,885	181	76	79
B900 CSD	CMS C.U. Share Draft Module	1,765	170	71	74
B900 CSC	CMS C.U. Share Certificate Module	1,765	170	71	74
EDUCATION CMS SCHOLASTIC II					
B900 SCR	Student Records	3,790	364	152	158
B900 SGP	Government/Scholastic II Payroll	2,685	258	108	112
B900 GOU	On-Line Utility Billing	4,600	441	184	192
B900 M06	On-Line Budgetary System	4,450	427	178	186
B900 GEM	GEM Data Kit	855	82	35	36
B900 GOT	On-Line Tax Billing System	4,600	441	184	192
B900 FXA	Fixed Asset System	990	95	40	42
B900 OLR	On-Line Cash CH and Receipting	890	86	36	38
B900 M09	On-Line Budgetary with Purchase Orders	5,865	563	235	245
B900 VOT	On-Line Voter Registration	2,400	230	96	100
COMMERCIAL BUSINESS MANAGEMENT SYSTEM II					
B900 CRO	Accounts Receivable	2,430	233	98	102
B900 CCO	Inventory Control	1,865	179	75	78
B900 CMO	Inventory Management	1,865	179	75	78
B900 CPO	Payroll	2,580	248	104	108
B900 CGO	General Ledger	1,700	163	68	71
B900 CYO	Accounts Payable	2,350	226	94	98
B900 CTO	Order Processing Input and Display Terminal System (order entry, invoicing, accounts receivable, and inventory control)	20,090	1,926	804	838
B900 CDO	Data Comm Module	810	78	33	34
B900 CID	On-Line Invoicing	2,820	271	113	118
PRODUCTION CONTROL SYSTEM I					
B900 MC1	Bill of Material	1,855	178	75	78
B900 MG1	Stock Status	1,610	155	65	68
B900 ME1	Work Center and Routing	1,855	178	75	78
B900 MJ1	Costing	1,415	136	57	59
B900 MP1	MBMS Payroll	2,580	248	104	108
B900 MS1	Order Release	1,400	135	56	59
B900 MH1	Job Cost Actual	2,820	271	113	118
B900 MQ1	On-Line Data Entry/Inquiry	810	78	33	34
B900 MR1	Material Requirements Planning	4,115	395	165	172
B900 MGL	Manufacturing General Ledger	1,700	163	68	71
CONTRACTOR BMS PROGRAM PRODUCTS					
B900 CM2	Data Base Maintenance	NC	NC	NC	NC
B900 CP2	Payroll and Labor Cost	2,255	217	91	94
B900 CA2	Accounts Payable	2,255	217	91	94
B900 CJ2	Job Cost Reporting	1,400	135	56	59
B900 CG2	General Ledger	1,400	135	56	59
B900 CQ2	On-Line Inquiry	380	37	16	16
B900 CD2	On-Line Entry and Inquiry	865	83	35	37
B900 CE2	Equipment Cost	990	95	40	42
B900 CT8	Contractor BMS Module	8,400	805	336	350
HOSPITAL BUSINESS MANAGEMENT SYSTEM					
B900 HAK	Hospital Payroll System	2,905	279	117	122
B900 HAT	On-Line BHAS II	5,195	498	208	217
B900 CGO	General Ledger	1,700	163	68	71
B900 CYO	Accounts Payable	2,350	226	94	98
B900 GPS	CMS Group Practice System	5,980	574	240	250
B900 GEM	GEM Data Kit	855	82	35	36
B900 APM	CMS Group Practice	1,885	181	76	79 ■