

Burroughs B 1900 Series

MANAGEMENT SUMMARY

The B 1900 Series computers, unveiled on October 8, 1979, are the small-to-medium-scale members of the new Burroughs "900" computer family. As one would expect, the new models deliver increased performance while maintaining full program compatibility with the B 1700 and B 1800 systems, their counterparts in the older Burroughs "700" and "800" computer families.

The initial B 1900 product line consists of three packaged computer systems: the entry-level B 1905, the more powerful B 1955, and the dual-processor B 1985. For B 1700 or B 1800 users who wish to retain their existing peripheral equipment, Burroughs also offers processor-only versions of the two larger systems designated the B 1955-1 and B 1985-1.

Burroughs states that the B 1900 systems will accomplish up to 30 percent more work in a given time period than the company's currently installed machines of this class, while occupying from 50 to 65 percent less floor space. These improvements are made possible by the use of denser and faster logic and memory circuits, larger main memory capacities, larger and faster cache memories, and more efficient programming and control software. High-density Transistor-Transistor Logic (TTL) is used in the B 1900 processors and controls to provide increased performance and reduce the number of electronic components, thereby enhancing system reliability. The maximum memory capacities of 512K bytes in the B 1905 and 2 megabytes in the B 1955 and B 1985 are twice the capacities of the corresponding B 1800 Series models. The capacity of the micro-instruction cache memory has also been doubled, from 4K bytes on the B 1800 processors to 8K bytes on all the new models. Two new operating systems—MCP- ➤

The B 1900 Series consists of three packaged small-to-medium-scale systems: the entry-level B 1905, the more powerful B 1955, and the dual-processor B 1985. They feature worthwhile price/performance improvements over the earlier B 1700 and B 1800 systems together with full program compatibility.

CHARACTERISTICS

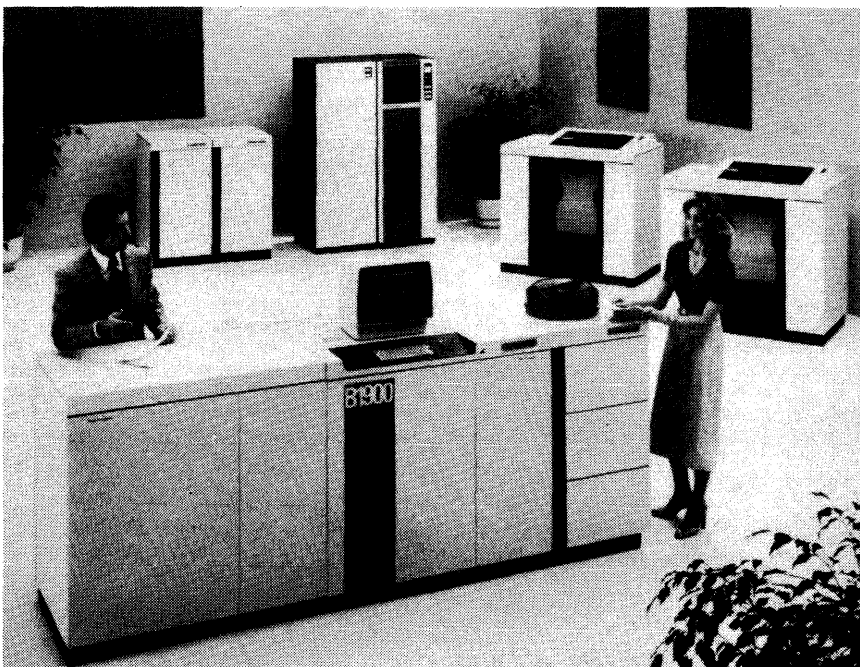
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Burroughs is generally considered to be one of the strongest competitors in the data processing marketplace, with a broad line of computer equipment spanning the range from small, entry-level systems to very large, multi-user, multi-processor systems. 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; and other related products. Burroughs is international in scope and employs some 50,000 people in more than 120 countries around the globe.

MODELS: Three packaged systems: the entry-level B 1905, the more powerful B 1955, and the dual-processor B 1985; and two processor-only systems: the B 1955-1 and the B 1985-1.

DATE ANNOUNCED: October 1979.

DATE OF FIRST DELIVERY: B 1905, B 1955, and B 1955-1—1st quarter 1980; B 1985 and B 1985-1—2nd quarter 1980. ➤



The B 1985, the largest current member of the B 1900 family, is a dual-processor system whose two central processors share from 524K bytes to 2 million bytes of main memory. The dual-processor configuration is designed to provide the continuous availability that is required in certain types of networking and commercial data processing operations.

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➤ TCS III for the B 1905 and MCP-TCS IV for the B 1955 and B 1985—combine an improved version of Burroughs' time-tested Master Control Program with the software facilities required for on-line transaction processing.

Like the earlier B 1700 and B 1800 Series, the B 1900 systems feature dynamically variable microprogramming, automatic multiprogramming, and virtual memory. Probably the most noteworthy feature of these systems is their "variable micrologic," an advanced form of microprogramming that alters the central processor's logical operations to suit the characteristics of each programming language. The central processors are "soft" machines whose logical structure is largely undefined until the appropriate microprograms are loaded to control their operations. Main memories which are addressable down to the individual bit level provide great flexibility in data field lengths and, according to Burroughs, yield increases of 20 to 40 percent in the efficiency of memory utilization for most applications.

The B 1900 Series systems, like the large-scale Burroughs systems, are programmed almost exclusively in higher-level languages. Compilers are available for the ANSI 74 COBOL, ANSI 77 FORTRAN, RPG, and BASIC languages, but not for PL/I. Associated with each compiler is an Interpreter, a specialized microprogram that is used at execution time to interpret and execute the code generated by the compiler. The B 1900 microprogramming itself is not user-accessible.

Burroughs is placing strong marketing emphasis on its library of Business Management Systems. These are groups of related application programs that should significantly reduce the cost and time required to get a B 1900 system into productive operation for many users in manufacturing, wholesaling, distribution, banking, utilities, hospitals, government agencies, schools, and motor freight companies. In addition, Burroughs will, for a fee, provide all the system support required to install and maintain a system.

The B 1955 can also operate with the Computer Management System (CMS) software used on the smaller Burroughs B 80, B 90, and B 800 systems. When the B 1955 is equipped with the CM-TCS systems software and a B 1360 Data Communications Processor, it can execute application programs written for any of the smaller CMS computers and can be intermixed with the other CMS computers in networks. According to Burroughs, the availability of CMS on the B 1955 provides from two to four times the performance previously available on CMS systems.

THE B 1900 MODELS

The packaged B 1900 Series computer systems differ primarily in central processor speed, number of processors, main memory capacity, and peripheral equipment.

The entry-level B 1905 consists of a 4-megahertz central processor, 131,072 bytes of MOS main memory (expandable to a maximum of 524,288 bytes), 8,192 bytes of cache memory, a 65.2-megabyte dual disk pack drive, a 320-lpm line printer, a single-line communications ➤

➤ DATA FORMATS

The B 1900 Series main memories are addressable to the bit level and utilize no preferred word or byte boundaries that are visible to the rest of the system. Variable instruction and operand lengths permit from 1 to 65,536 bits of data to be addressed with a single instruction, and up to 24 bits can be transferred in parallel between main memory and the processor. According to Burroughs, this feature yields a 20 to 40 percent reduction in memory requirements for typical programs.

INTERNAL CODE: EBCDIC; other media codes, such as ASCII, can be translated. ASCII is used with the Computer Management System (CMS) software.

MAIN STORAGE

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

CAPACITY: B 1905—131,072, 262,144, 393,216, or 524,288 bytes; B 1955, B 1955-1, B 1985, or B 1985-1—524,288 to 2,097,152 bytes in 262,144-byte increments.

CHECKING: All models employ error-correcting (EC) main memory. EC detects and corrects all single-bit main memory errors and detects most multiple-bit errors. EC generates a 3-bit check field for each 8-bit byte as it is written, and recomputes the field when the byte is read. If the check bits do not match, the erroneous bit is corrected before data is transmitted to the processor. EC helps to provide uninterrupted operation and is transparent to the user. A modified Hamming code is used by the hardware encoder on each memory board to construct the check field.

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

CENTRAL PROCESSORS

The B 1900 Series processors feature dynamically variable microprogrammed logic and bit-addressable memories. The processors' logic functions are performed by a set of elementary operators called microinstructions, which operate on strings of bits. There are 32 defined microinstructions in the B 1900 processors. All current microinstructions are 16 bits in length.

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

For each B 1900 programming language, Burroughs has defined an "ideal machine" and developed a specialized microprogram, called an Interpreter, that makes the B 1900 appear to be logically equivalent to that machine. The interpreter executes the instructions which have been generated by the corresponding compiler. These compiler-generated instructions are expressed in an appropriate S-language. Because the S-language and its Interpreter are oriented toward the characteristics of each programming language, Burroughs states that on the average only about one-tenth as many S-instructions need to be executed to perform a given function as in typical machine-level computer programs.

No execution times for either individual microinstructions or S-instructions have been released by Burroughs to date. ➤

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CHARACTERISTICS OF THE B 1900 SYSTEMS

	B 1905	B 1955	B 1985
CENTRAL PROCESSORS			
Date announced	October 1979	October 1979	October 1979
Date of first delivery	1st quarter 1980	1st quarter 1980	2nd quarter 1980
No. of central processors	1	1	2
Processor cycle time, nanoseconds	250	167	167
Maximum processor I/O controls	6	8	8
Max. processor + expansion I/O controls	6	15	15
MAIN MEMORY			
Minimum capacity, bytes	131,072	524,288	524,288
Maximum capacity, bytes	524,288	2,048,000	2,048,000
Read cycle time, nanoseconds (per byte)	500	333	333
Chip size (bits)/type	16K/n-channel MOS	16K/n-channel MOS	16K/n-channel MOS
Checking	Error correcting	Error correcting	Error correcting
MICROINSTRUCTION CACHE MEMORY			
Minimum capacity, bytes	8,192	8,192	16,384 (8K per CPU)
Maximum capacity, bytes	8,192	8,192	16,384 (8K per CPU)
Read cycle time, nanoseconds (per 16-bit access)	82	55	55
COMMUNICATIONS CAPABILITIES			
Maximum no. of lines	1 std.; 2 max.	8 std.; 32 max.	8 std.; 32 max.
Synchronous	Opt.; to 50,000 bps	Opt.; to 50,000 bps	Opt.; to 50,000 bps
Asynchronous	Opt.; to 9,600 bps	Opt.; to 9,600 bps	Opt.; to 9,600 bps
Protocols supported	Basic Mode, BDLC, Bisync	Basic Mode, BDLC, Bisync	Basic Mode, BDLC, Bisync
Single-line communications control	Yes	Yes	Yes
Multi-line communications control	No	Yes	Yes
MAXIMUM I/O SPEEDS			
80-column card reading	300-800 cpm	300-800 cpm	300-800 cpm
80-column card punching	150/300 cpm	150/300 cpm	150/300 cpm
96-column card reading	300/1000 cpm	300/1000 cpm	300/1000 cpm
96-column card punching	60 cpm	60 cpm	60 cpm
Printing (standard character sets)	85-1500 lpm; 320 std.	85-1500 lpm; 650 std.	85-1500 lpm; 650 std.
Magnetic tape I/O (PE)	40/80 KBS	40/80/120 KBS	40/80/120 KBS
Magnetic tape I/O (NRZI)	No	20/40/60 KBS	20/40/60 KBS
Magnetic tape I/O (NRZI/PE)	No	40/80/120 KBS PE; 20/40/60 KBS NRZI	40/80/120 KBS PE; 20/40/60 KBS NRZI
Cassette tape I/O	1 KBS	1 KBS	1 KBS
MICR/OCR reader-sorters	No	900-1625 dpm	900-1625 dpm
AVAILABILITY OF MASS STORAGE			
Disk cartridge drives	No	No	No
Dual disk cartridge drives	No	No	No
Dual disk pack drives	Yes	Yes	Yes
Fixed disk drives	Yes	Yes	Yes
Mini-disk drives	Yes	Yes	Yes

➤ control, a display console, and one Data Communication line. The basic B 1905 system can be purchased for \$71,500 or leased for one year at \$2,440 per month. Three- and five-year leases are also available. Maintenance is priced at \$410 per month. (All hardware lease rates include maintenance.) The B 1905 is restricted to a maximum of four disk drives and two single-line communications controls, and it cannot be equipped with MICR reader-sorters or NRZI magnetic tape units. A maximum of six I/O controls can be used. The basic B 1905 system occupies only one-third of the floor space required by its B 1800 Series counterpart, the B 1815, while delivering up to 30 percent more performance. Entry-level B 1905 systems can operate in any normal office environment, according to Burroughs.

The B 1955 system consists of a faster 6-megahertz central processor, 524,288 bytes of MOS main memory ➤

➤ Under MCP control, it is possible for programs written in two or more languages to run concurrently in a multi-programming mix. In this case, all of the corresponding Interpreters reside in main or control memory, and the B 1900 changes rapidly from one state to another (e.g., from a "COBOL machine" to a "FORTRAN machine") whenever the MCP transfers control from program to program. The Interpreters, S code, and user data are all location-independent.

All of the B 1900 Series processor models are program-compatible and similar in architecture. They utilize transistor-transistor logic (TTL) and feature a high-speed, bipolar microinstruction cache memory with a capacity of 8,192 bytes. The processor has the capability to dynamically execute all types of microcode from this memory, which is managed by the hardware on a demand basis, thereby allowing a greater percentage of microinstructions to be resident in the cache for immediate retrieval. Overlap logic within the system provides for complete simultaneity of ➤

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➤ (expandable to a maximum of 2 megabytes), 8,192 bytes of cache memory, a 65.2-megabyte dual disk pack drive, a 650-lpm line printer, an 8-line communications control, and a display console. It can be purchased for \$104,000 or rented for \$3,531 per month on a one-year lease, \$3,191 per month on a three-year lease, or \$3,025 per month on a five-year lease. Maintenance is priced at \$540 per month. The B 1955 system can be expanded to include up to 15 I/O controls and a wide variety of peripheral equipment. An expansion cabinet is required when the memory capacity exceeds one megabyte and/or the number of I/O controls exceeds eight. Burroughs rates the B 1955's performance approximately 30 percent above that of the B 1905.

The B 1985 is a dual-processor, master/slave system consisting of two 6-megahertz central processors sharing 524,288 bytes of MOS main memory (expandable to a maximum of 2 megabytes), 8,192 bytes of cache memory per processor, a 130-megabyte dual disk pack drive and control, a 650-lpm line printer, an 8-line communications control, a display console, and an expansion cabinet. The basic system can be purchased for \$148,960 or rented for \$4,824 per month on a one-year lease. Three- and five-year leases are also available. Maintenance is priced at \$648 per month. The system can include up to 15 I/O controls.

The B 1955-1 and B 1985-1 are the same as the B 1955 and B 1985 systems, respectively, except that the disk pack drive, line printer, and printer control are omitted and the prices are correspondingly reduced.

Main memory for all the B 1900 systems is built from 16K-bit chips. A 131K-byte add-on memory increment for the B 1905 is purchased-priced at \$3,450. A 262K-byte memory increment usable with any of the B 1900 Series processors has a purchase price of \$5,750.

PERIPHERALS AND COMMUNICATIONS

The peripheral equipment for the B 1900 systems includes a wide variety of removable and non-removable disk storage units, line printers, MICR/OCR document reader/sorters, magnetic tape and cassette drives, diskette drives, 80- and 96-column card devices, and display terminals. Introduced along with the B 1900 computers were two new line printers, the 320-lpm B 9246-3 and the 650-lpm B 9246-6, which use operator-changeable print bands to produce high-quality printing at a relatively low cost.

The increasingly important role of data communications is underlined by the fact that a communications control is included in each of the packaged B 1900 systems. A single-line control is part of the entry-level B 1905, and a B 1352 Multi-Line Communications Control (MLC) is included in the B 1955 and B 1985 systems. The basic B 1352 handles up to 8 lines, and the B 1353 MLC Extension permits a total of 16 communications lines to be attached to each control. With the MLC, a B 1900 Series system can function either as a central computer in a multiple-line communications network or as a high-powered remote terminal communicating with a larger central computer.

The Burroughs Network Architecture (BNA) is designed to enhance the interaction of terminals with host CPU's ➤

➤ fetch/execute and effectively eliminates read access time when executing from the cache.

The B 1985 is a dual-processor system in which the two processors share a common memory and operate under a master/slave concept. The master processor contains the MCP operating system and executes all system code as well as performing all resource management. While the master processor can also execute user code, the slave processor *only* executes user code, making demands on the master to execute system code. The B 1985 master/slave system is queue-driven. If the master is executing user code, the slave may queue its request to the master and interrupt it. Upon completion of the requested work, the master is free to return to the user job it suspended.

CONTROL STORAGE: See table for cache memory speeds and capacities.

INTERRUPTS: The B 1900 Series processors use a "soft" interrupt system, meaning that interrupt conditions do not cause any automatic hardware actions. Instead, the recognition of interrupt conditions and initiation of the appropriate actions is completely under software control.

PHYSICAL SPECIFICATIONS: The B 1905 central processor is 44 inches (112 cm) high, 24 inches (61 cm) wide, 29 inches (74 cm) deep, and weighs 360 pounds (164 kg). The B 1955 central processor is 44 inches (112 cm) high, 45 inches (115 cm) wide, 29 inches (74 cm) deep, and weighs 650 pounds (295 kg). The dual B 1985 processors are housed in a cabinet that is 44 inches (112 cm) high, 90 inches (219 cm) wide, 29 inches (74 cm) deep, and weighs 1300 pounds (591 kg).

INPUT/OUTPUT CONTROL

I/O CHANNELS: Each type of peripheral device or subsystem requires a different I/O control, and each I/O control, in turn, requires an appropriate number of card slots in the processor chassis or expansion cabinet. The maximum number of I/O controls allowed in each B 1900 system is listed in the table.

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

CONFIGURATION RULES

The basic packaged *B 1905* system consists of a 4-MHz central processor with 131,072 bytes of main memory and 8,192 bytes of cache memory, a console display and control, a 65.2-megabyte dual disk pack drive and control, a 320-lpm B 9246-3 Line Printer and control, and a B 1351-2 Universal Single-Line Communications Control. The basic processor cabinet accommodates the maximum complement of 6 I/O controls and 524,288 bytes of main memory; no expansion cabinet is available. Only Type A and B I/O controls are allowed, and a maximum of two single-line communications controls may be used. The built-in disk electronics controller accommodates a maximum of four disk drives. The following peripheral devices are not allowed on B 1905 systems: MICR reader-sorters, NRZI magnetic tape units, and multi-line communications controls.

The basic packaged *B 1955* system consists of a 6-MHz central processor with 524,288 bytes of main memory and 8,192 bytes of cache memory, a console display and control, a 65.2-megabyte dual disk pack drive and control, a 650-lpm B 9246-6 Line Printer and control, and an 8-line B 1352 Multi-Line Communications Control. An expansion cabinet is required when the main memory capacity exceeds 1,048,576 bytes. The basic cabinet holds up to 8 I/O controls in addition to the multi-line control, and an expansion cabinet permits up to 15 I/O controls to be used. ➤

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▷ in network environments. BNA facilitates Burroughs' commitment to move into distributed data processing. Through the new architecture, Burroughs processors and terminals can be granted access to data bases throughout a network, job tasks and information files can be transferred from one point to another, and data processing resources available anywhere in a network can be shared by participants regardless of the distance between them.

To facilitate the development of communications control programs, Burroughs provides the Generalized Message Control System (GEMCOS), a parameter-based system that operates user-tailored Message Control Programs, plus the Network Definition Language (NDL) and User Programming Language (UPL). NDL is a language and compiler that enables users to define and generate customized network control programs. UPL is an ALGOL-like language and compiler designed to aid experienced programmers in solving complex message handling problems. The GEMCOS Message Control System forms the interface between the network control program and the user programs processing the communications messages.

Remote job entry applications can be implemented on the B 1900 Series systems through the HASP Remote Terminal Program Product and the Power/RJE Remote Terminal Program Product. Operating under MCP, the HASP program enables the B 1900 to multiprogram on-site processing with remote job entry to IBM System/360 or System/370 computers operating under the HASP binary synchronous multi-leaving protocol. Using the Power/RJE program, B 1900 systems are made to look like IBM 2770 remote workstations. Under control of the MCP, the B 1900 systems function as remote batch terminals on-line to an IBM 360/370 or 4300 system running DOS/POWER. Other Burroughs programs enable the B 1900 systems to serve as remote job entry terminals for the larger Burroughs B 2000, B 3000, B 4000, B 6000, or B 7000 Series computers.

SOFTWARE

Software support for the B 1900 Series computers centers on the two new operating systems, MCP-TCS III for the B 1905 and MCP-TCS IV for the B 1955 and B 1985. MCP-TCS III consists of the Master Control Program (MCP) for overall system control, the Network Definition Language (NDL) for generating communications control programs, the ODESY system for on-line data entry and validation, either the Text Editor or CANDE for on-line programming and/or file updating, system utilities to handle sorting and other routine operations, and the user's choice of one compiler (e.g., COBOL, RPG II, FORTRAN, or Interactive BASIC). MCP-TCS IV includes all the facilities of MCP-TCS III plus the Generalized Message Control System (GEMCOS) and either the DMS-II data base management system or the Reporter System for generating customized report programs.

Software for the B 1900 systems is totally unbundled. The MCP-TCS III system can be rented for \$250 per month or purchased for a \$7,500 initial payment and a \$1,200 annual license fee. The MCP-TCS IV software

▶ The basic *B 1955-1* system is the same as the basic B 1955 system except that the dual disk pack drive, line printer, and printer control are omitted.

The basic packaged *B 1985* system consists of 6-MHz master and slave central processors, 524,288 bytes of main memory, 8,192 bytes of cache memory per processor, an expansion cabinet, a console display and control, a 130-megabyte dual disk pack drive and control, a 650-lpm B 9246-6 Line Printer, and an 8-line B 1352 Multi-Line Communications Control. The system can include up to 15 I/O controls in addition to the multi-line control.

The basic *B 1985-1* system is the same as the basic B 1985 system except that the dual disk pack drive, line printer, and printer control are omitted.

Seven different types of I/O controls are available for the B 1900 Series systems. The number and types of I/O controls that can be connected to each system are governed by the overall limitations shown in the table, by restrictions on the number of card slots available, and by various complex interrelationships. The B 1905 can use only Type A and B controls and can have a maximum of six controls, of which no more than two can be Type B. The total number of card slots cannot exceed 58 on a B 1955 or B 1955-1 system or 40 on a B 1985 or B 1985-1 system.

The types of I/O controls required by the various I/O units used with the B 1900 systems are as follows:

Control Type A (one I/O card)

All 80-column card readers (300, 600, or 800 cpm)
All 80-column card punches (150 or 300 cpm)
9249 Printers (85, 180, 250, or 350 lpm)
9246 Printers (320 or 650 lpm)
9247 Printers (400, 750, 1100, or 1500 lpm)
Single-line communications control (for B 1905 only)

Control Type B (two I/O cards)

All 96-column card readers (300 or 1000 cpm)
9418 80-column Reader/Punch Data Recorder (200/45 cpm)
9419 96-column Reader/Punch Multi-Purpose Card Unit (300/60 cpm)
MICR reader-sorters (900, 1000, or 1625 lpm)
9490 Cassette Tape Subsystem
9484 Disk Drives
9489 Mini-Disk Drives
9495, 9496 PE Magnetic Tape Units
NRZI/PE magnetic tape unit switchable configuration (also requires control type G)

Control Type F (four I/O cards)

Single-line communications control

Control Type G (eight I/O cards)

9495, 9496 NRZI Magnetic Tape Units
Four-line multi-line communications control

Control Type H (six I/O cards)

Dual-line communications control

Control Type J (twelve I/O cards)

Eight-line multi-line communications control
DCP-1 data communications processor

Control Type K (ten I/O cards)

Eight-line multi-line communications control extension
DCP-1 extension

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➤ can be rented for \$600 per month or purchased for an \$18,000 initial charge and a \$2,880 annual license fee. The compilers, application programs, and other software components are separately licensed at the rates shown in the "Software Prices" section of this report.

The principal B 1900 software facility is the Master Control Program, an integrated operating system that complements the hardware to create an unusually effective environment for multiprogrammed operation. Like the MCP operating systems for the larger Burroughs computers, the B 1900 MCP is user-oriented and much easier to understand and use than most of the competitive operating systems. The MCP receives its orders through straightforward messages entered via the console keyboard or control cards.

A new version of the MCP, Level 9.0, will be delivered with the B 1900 systems and is expected to deliver performance improvements of up to 20 percent. Level 9.0 of the MCP will be accompanied by improved versions of the ANSI 74 COBOL, ANSI 77 FORTRAN, RPG, and Interactive BASIC compilers.

COMPATIBILITY AND COMPETITION

The B 1900 systems provide full object-code compatibility with the architecturally similar Burroughs B 1700 and B 1800 systems. Integrated Interpreters, which operate under control of the MCP operating system and permit direct execution of object programs written for older computers, are available for the IBM 1401/1440/1460, the IBM 1130, and Burroughs' own B 100/200/300/500 Series computers.

Program compatibility with other computers is achieved via higher-level languages. The B 1900 COBOL and FORTRAN compilers conform to the American National Standards for these languages. Programs written in RPG or RPG II for IBM computers can either be compiled by the B 1900 RPG compiler or translated into COBOL by the COFIRS II (COBOL from IBM RPG Specifications) routines.

The B 1900 systems compete against the IBM System/38 (as an alternative growth path for users of the System/3, System/32, or System/34) and against systems such as the Univac 90/30 and the Honeywell Levels 62 and 64.

USER REACTION

Volume shipments of the B 1900 systems had not begun as this report went to press, so no meaningful assessment of user experience with the new systems can be made. However, the ratings and opinions expressed in the User Reaction section of the Burroughs B 1800 Series report (70C-112-05) should be largely applicable to the B 1900 systems as well. □

➤ MASS STORAGE

B 9484 DUAL DISK SUBSYSTEM: Usable on all B 1800 and B 1900 Series systems, the B 9484 subsystem consists of a B 1486-1 Dual Disk Pack Control and either a 65.2-megabyte B 9484-25 Dual Disk Pack Drive and Electronic Controller; a 130.4-megabyte B 9484-55 Dual Disk Pack Drive and Electronic Controller with optional add-ons; or a B 9499-6 Universal Disk Drive Electronic Controller and

add-ons. Add-ons to the B 9484-55 or B 9499-6 may be any combination of 130.4-megabyte B 9484-5 Add-on Dual Disk Drives, 201-megabyte B 9484-2 Single Fixed Disk Drives, and 402-megabyte Dual Fixed Disk Drives, up to a maximum of three additional units on a B 9484-55 or four on a B 9499-6.

On all B 1900 systems, the B 1486-1 Dual Disk Pack Control is included in the basic system configuration, and the required Electronic Controller is built into the system cabinet. A 65.2-megabyte B 9484-2 Dual Disk Pack Drive (which is a B 9484-25 without the Electronic Controller) is standard in the basic B 1905 and B 1955 systems, while a 130.4-megabyte B 9484-5 Dual Disk Pack Drive (a B 9484-55 without the Electronic Controller) is standard in the basic B 1985 system. The B 1905 has a 1x4 Electronic Controller and is thereby limited to a maximum of four spindles of disk storage, while the larger B 1900 Series systems have a 1x8 Electronic Controller.

The B 9484-25 Dual Disk Pack Drive consists of two spindles with an on-line storage capacity of 32.6 megabytes per spindle. The average head movement time for the B 9484-25 is 25 milliseconds, the average rotational delay is 8.3 milliseconds, and the data transfer rate is 605,000 bytes per second. The B 9484-25 employs a 5-platter disk pack with 5 usable surfaces. Each surface contains 406 data tracks plus 1 spare. There are 180 bytes per sector, 90 sectors per track, and 16,200 bytes per track.

The B 9484-55 is a double-density version of the B 9484-25 with 370 tracks per inch, 814 tracks per surface, 65.2 megabytes per spindle, and other specifications the same. The B 9484-5 is the add-on drive for the B 9484-55.

The B 9494-2 is a fixed disk drive with a single spindle and a capacity of 201 megabytes. There are 8 surfaces for data storage, with 714 tracks per inch and 1564 tracks per surface. The 9494-2 packs data at 6551 bits per inch. There are 90 sectors per track and 180 bytes per sector. The drive rotates at 3672 rpm. The average head movement time is 28 milliseconds, the average rotational delay is 8.2 milliseconds, and the data transfer rate is 650,000 bytes per second.

The B 9494-4 is the dual-spindle version of the B 9494-2, with a total formatted data capacity of 402 megabytes.

B 9489 INDUSTRY-COMPATIBLE MINI-DISK (ICMD) DRIVES: These floppy disk drives are available only as free-standing units. The 9489-17 is a single ICMD drive in a 30-inch cabinet, while the 9489-16 consists of dual ICMD drives housed in a 44-inch cabinet. Control for the B 9489 drives is furnished by the B 1489/-80 Mini-Disk Control. Any combination of up to two cabinets (two, three, or four spindles) may be connected to a B 1489/-80. 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 transfer rate is 31K bytes per second.

INPUT/OUTPUT UNITS

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

There are currently three 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. ➤

Burroughs B 1900 Series



The B 1905 is the entry-level member of the B 1900 Series. Designed to operate in any normal office environment, it occupies only one-third of the floor space required by its B 1800 Series counterpart, the B 1815, while delivering up to 30 percent more performance.

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

DIRECT DATA ENTRY: B 1900 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 1900 processors utilizing Burroughs TD 73X or TD 83X visual display units connected either directly or via data sets. These systems can use the Burroughs Data Entry Software (DEI) and, for remote programming facilities, the Burroughs Text Editor. The Data Entry Software (DEI) 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.

A more comprehensive direct data entry system is a B 1900 processor utilizing Burroughs TD 73X and/or TD 83X visual display units connected directly or via data sets. Combined with Burroughs' On-Line Data Entry System, ODESYS (DE2), NDL and, for remote programming capability, Burroughs' Command And Edit (CANDE), this system provides the user with substantial flexibility.

B 9490-25 CASSETTE TAPE SUBSYSTEM: Consists of a B 1490 cassette control and either two B 9490-25 Cassette Tape Stations or an integrated console cassette unit and one B 9490-25 Cassette Tape Station. The cassette unit records at a density of 800 bits per inch and has a capacity of up to 861 256-byte records on 282 feet of tape. The tape contains two tracks, with one for clocking and the other for bit serial encoding using an 8-bit ASCII code. Recording is NRZI at 10 ips. The unit has read-after-write electronics and rewinds tape at 60 ips. The data transfer rate is 1000 bytes per second.

B 9495 MAGNETIC TAPE UNITS: These 9-track tape drives record data on 1/2-inch tape in IBM-compatible phase-encoded mode at 1600 bpi and/or in NRZI mode at 800 bpi. The B 9495-7 has a tape speed of 25 ips and a data transfer rate of 20,000 bytes per second (800 bpi) or 40,000 bytes per second (1600 bpi). The 9495-8 has a tape speed of 50 ips and a data transfer rate of 40,000 bytes per second (800 bpi) or 80,000 bytes per second (1600 bpi). The 9495-82 has a tape speed of 75 ips and a data transfer rate of 60,000 or 120,000 bytes per second for 800 bpi or 1600 bpi, respectively. Maximum time to rewind a 2400-foot reel of tape is 115 seconds for the 9495-7, 96 seconds for

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► the 9495-8, and 92 seconds for the 9495-82. All three drives can handle 10.5-inch reels holding 2400 feet of tape. The drives feature a single vacuum-driven capstan, a sealed tape-path chamber, a power access window, a positive reel latch, automatic tape threading and loading, and "on-the-fly" detection and correction of most errors. A unique "coaxial" hub mounts the feed reel directly in front of the tape-up reel, reducing the overall width of the unit to just 24 inches.

The B 9495 drives can be configured in numerous ways, depending on the model, master electronics unit, and tape control:

Tape Drive Model:	B 9495-7	B 9495-8	B 9495-82
B 1495-32 PE Tape Control and B 9499-33 1x4 Elect. Unit or B 9499-34 1x8 Elect. Unit	Up to 4 Up to 8	Up to 4 Up to 8	— —
Dual B 1495-32 PE Controls and B 9499-35 2x8 Elect. Unit	Up to 8	Up to 8	—
B 1495-32 PE Tape Control and B 9499-50 1x4 Elect. Unit or B 9499-51 1x8 Elect. Unit	— —	— —	Up to 4* Up to 8*
Dual B 1495-32 PE Controls and B 9499-52 2x8 Elect. Unit	—	—	Up to 8*
B 1491-30 NRZI Tape Control and B 9499-33 1x4 Elect. Unit: with B 9499-5 NRZI Option** with B 9999-5 NRZI Option**	Up to 4* —	Up to 4* —	— Up to 4*
B 1491-30 NRZI Tape Control and B 9499-34 1x8 Elect. Unit: with B 9499-5 NRZI Option** with B 9999-5 NRZI Option**	Up to 8* —	Up to 8* —	— Up to 8*
Dual B 1491-30 NRZI Controls and B 9499-35 2x8 Elect. Unit: with B 9499-5 NRZI Option** with B 9999-5 NRZI Option**	Up to 8* —	Up to 8* —	— Up to 8*
B 1495-35 NRZI/PE Dual Control and B 9499-35 2x8 Elect. Unit: with B 9999-5 NRZI Option***	Up to 8*	Up to 8*	—
B 1495-35 NRZI/PE Dual Control and B 9499-52 2x8 Elect. Unit: with B 9499-5 NRZI Option***	—	—	Up to 8*

*Cannot be configured on B 1905 system.

**Each unit requires a PE/NZRI Switchable Feature but operates in NRZI mode only.

***Each unit requires a PE/NRZI Switchable Feature unless it is to operate in PE mode only.

As a lower-priced alternative to the 40 KBS and 80 KBS phase-encoded tape subsystems shown in the first line of the above table, Burroughs offers the packaged B 9495-4X Magnetic Tape Subsystems. The B 9495-41 consists of a B 9499-33 1x4 Electronics Unit and one 40 KBS B 9495-7 Magnetic Tape Drive, and the B 9495-42 is its two-drive counterpart. The B 9495-45 consists of a B 9499-33 1x4 Electronics Unit and one 80 KBS B 9495-8 Magnetic Tape Drive, and the B 9495-46 is its two-drive counterpart. Each of these subsystems connects to a B 1495-32 PE Tape Control, and each can be expanded to a maximum of four tape drives.

B 9246 BAND PRINTERS: These two printers, introduced with the B 1900 Series systems in October 1979, are designed for customers who require medium-speed printing together with high reliability and print quality. Rated printing speeds depend upon the size of the character set, as follows:

	B 9246-3	B 9246-6
48-character set	320 lpm	650 lpm
64-character set	300 lpm	600 lpm
96-character set	200 lpm	450 lpm

A 64-character EBCDIC print band is standard on both models. Optional print bands include a 48-character ASCII set, a 64-character ASCII set, a 64-character OCR A set, a 64-character OCR B set, and a 96-character OCR B set. The print bands are operator-changeable. Both of the B 9246 Printers have the following features: 132 print positions, horizontal spacing of 10 characters per inch, vertical spacing of 6 or 8 lines per inch, skipping speed of 15 inches per second, full-line print buffer, electronic forms control buffer (loaded from a standard 12-channel format tape), and interchangeable ribbon cartridge. A B 9246-3 or B 9246-6 Printer can be connected to any B 1900 Series system by means of a B 1249/-80 Control. The B 9246-3 is part of the basic B 1905 system, and the B 9246-6 is included in the basic B 1955 and B 1985 configurations. First shipments are scheduled for the first quarter of 1980.

B 9247 TRAIN PRINTERS: These printers use the horizontal-train technique to produce high-quality printing and are offered in five models with the following rated speeds:

B 9247-12: 400 lpm*
B 9247-13: 750 lpm*
B 9247-14: 1100 lpm
B 9247-15: 1500 lpm
B 9247-16: 750 lpm

*Discontinued model; subject to availability.

All five models have 132 print positions. The B 9247 Train Printers achieve their rated speeds with the standard 48-character train module; other interchangeable modules containing 16, 64, or 96 printable characters are also available, and the 96-character set contains both upper and lower case ASCII or EBCDIC alphabets. The train printers handle vertical format control through either the Burroughs Forms-Self Align System, which uses codes preprinted on the forms, or a 12-channel VFU. They can employ 4- to 20-inch-wide paper and have a skipping speed of 20 ips. The B 9247 Train Printers require a B 1247/-80 Control (-12, -13, and -16 submodels), a B 1247/-84 Control (-14 submodel), or a B 1247/-85 Control (-15 submodel).

B 9249 CHAIN PRINTERS: These horizontal-chain units are offered in four models with the following rated speeds:

B 9249-1: 85 lpm
B 9249-2: 160 lpm
B 9249-3: 250 lpm
B 9249-4: 350 lpm

A 48-character EBCDIC or ASCII character set is standard on the B 9249 Chain Printers, with 64- and 96-character sets optional. These printers have an 8.3-ips skipping speed, employ 3- to 17-inch-wide paper, print at 10 characters to the inch, and utilize a 2-channel VFU, with a 12-channel VFU optional. The B 9249 Printers require a B 1249/-80 Control.

B 9115 CARD READER: Reads standard 80-column cards serially by column at a rated speed of 300 cpm. Reads EBCDIC or binary-coded cards. Cards are read photoelectrically, with a double strobe comparison for each column to help ensure reading accuracy. A single input hopper and output stacker hold up to 1000 cards each. Usable with any B 1900 Series system. Each B 9115 requires a B 1115/-80 Control. The optional B 9915 Feature enables the B 9115 to read 51-column cards.

B 9116 CARD READER: Reads up to 600 cpm. Otherwise, has the same characteristics as the B 9115 described above.

B 9117 CARD READER: Reads up to 800 cpm. Otherwise, has the same characteristics as the B 9115 described above.

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► **B 9212 CARD PUNCH:** Punches standard 80-column cards at up to 150 cards per minute. Usable with any B 1900 Series system, the B 9212 requires a B 1213/-80 Control.

B 9213 CARD PUNCH: Punches standard 80-column cards at up to 300 cpm. The feed hopper holds up to 2200 cards, and three program-selectable stackers hold at least 1400 cards each. Usable with any B 1900 Series system, the B 9213 requires a B 1213/-80 Control.

B 9119-1 CARD READER: Reads 96-column cards at 300 cpm. Includes a 600-card input hopper and one 600-card stacker. Fits on a tabletop, where it occupies less than 1.5 square feet. Usable with any B 1900 Series system, the B 9119-1 requires a B 1119/-80 Control.

B 9119-2 CARD READER: Similar to the B 9119-1, but reads 96-column cards at 1000 cpm. Usable with any B 1900 Series system, the B 9119-2 requires a B 1119/-80 Control.

B 9418-2 CARD READER PUNCH/DATA RECORDER: Reads 80-column cards at 200 cpm, and punches and/or prints full cards at 45 cpm; higher punching speeds are possible if fewer columns are punched. The single card feed path includes: 600-card primary input hopper, 400-card secondary input hopper, read station, visible wait station, punch station, punch check station, print station, and two 400-card stackers. The unit features a 64-character movable keyboard, 64-character printing, a full 80-column print line, and 80-column read, punch, and print buffers. Usable with any B 1900 Series system, the B 9418-2 requires a B 1418/-80 Control.

B 9419-2 CARD READER PUNCH/DATA RECORDER: Reads 96-column cards at 300 cpm, and punches and/or prints full cards at 60 cpm; higher punching speeds are possible if fewer columns are punched. The single card feed path includes: 600-card primary input hopper, 400-card secondary input hopper, read station, visible wait station, punch station, punch check station, print station, and two 400-card stackers. The print station permits printed interpretation of the punched data at 60 cpm, with three 32-character lines per card. Input and output data is buffered, and the unit features a keyboard that permits off-line use as a 96-column keypunch or verifier. Program storage for four format-control programs is included. Usable with any B 1900 Series system, the B 1419-2 requires a B 1419/-80 Control.

B 9416-6 MULTI-PURPOSE CARD UNIT: Provides the same 300-cpm reading, 60-cpm punching, and 60-cpm printing facilities and data recorder keyboard as the 9419-2 Card Reader Punch/Data Recorder described above, plus the ability to sort cards into any of six 400-card stackers under program control at 300 cpm. Can be used off-line for sorting, keypunching, or verifying. Numeric sorting requires 1.5 passes per card column, while alphabetic sorting requires 2.5 passes per card column. The B 9419-6 requires a B 1419/-80 Control and is usable with any B 1900 Series system.

MICR READER-SORTERS: The five MICR Reader-Sorters available for use with the B 1900 Series systems have the following characteristics:

- B 9135-2:** 900 dpm, 8 stacker pockets; B 1130/-80 Control.
- B 9135-3:** 900 dpm, 12 stacker pockets; B 1130/-80 Control.
- B 9134-1:** 1625 dpm, 4, 8, 12, or 16 stacker pockets; B 1130 Control.
- B 9137-1:** 1625 dpm, 4, 8, 12, or 16 stacker pockets; has B 9937-22 "double read" MICR E13-B capability to reduce the number of reject items or B 9937-30 Numeric OCR A Size 1 Feature; B 1130 Control.
- B 9137-4:** 1000 dpm, 8 stacker pockets; B 1130 Control.

None of the MICR Reader-Sorters can be used with the B 1905 system.

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

The B 9134-1 and B 9137-1 are high-performance units that can be equipped with a variety of optional features. The B 9134-1 on-line optional features include 4-pocket add-on modules, stacker overflow, valid character check, multi-track E13B, endorser, batch ticket detector, short document read, short document module expander, mobile carrier, resettable or non-resettable item counter, and running-time meter. Off-line features include basic and extended sort, digit override, edit field override, or edit and zero kill, including a numeric optical character recognition feature. In addition, the B 9137-1 is equipped with a double read capability so that MICR characters are read twice during each pass by two separate read heads. The first read is called a "deep" read, in which an attempt is made to interpret imperfect characters, and the second is a "shallow" read which is capable of reading perfect MICR characters.

TD 73X SELF-SCAN DISPLAY/KEYBOARD: This display unit has the capability to display 12 lines of 40 characters for a total of 480 characters. A 128 ASCII character set is employed, with each character displayed in a 5-by-7 dot matrix. Illumination is red phosphor. The TD 73X has extended memory options; A/N source data, 10-key auxiliary, alphanumeric, and extended alphanumeric keyboards; and various peripherals. Data rates are 150 to 1800 bps asynchronous, 2400 to 4800 bps synchronous, 9600 bps via two-wire direct interface (TDI), and 64,000 bps via Burroughs direct interface (BDI).

The TD 731 has control for asynchronous data sets and direct-connect communications interfaces; the TD 733, control for synchronous data sets; and the TD 737, control for synchronous data set communications and IBM bi-synchronous data communications procedures. The TD 732, TD 734, and TD 738 are equivalent to the TD 731, TD 733, and TD 737, respectively, but with peripheral capability added. Available peripherals include a magnetic card reader, cassette tape drives, and printers of the B 9249 series.

TD 83X CRT DISPLAY KEYBOARD: Displays 24 lines plus a systems line. Each line is 80 characters wide, yielding a total display capacity of 2000 characters including the systems line. The character set is displayed by means of a 5-by-7 dot matrix and contains 128 ASCII characters. The TD 83X includes such features as negative, reverse, blink, and blank video. This CRT utilizes the same keyboards and peripherals as the TD 73X. Data rates are 75 to 1800 bps asynchronous, 2400 or 4800 bps synchronous, 9600 bps via TDI, and 64,000 bps via BDI.

The TD 831 has control for asynchronous data sets and direct-connect communications interfaces; the TD 833, control for synchronous data sets, and the TD 837, control for synchronous data set communications and IBM bi-synchronous data communications procedures. The TD 832, TD 834, and TD 838 are equivalent to the TD 831, TD 833 and TD 837; respectively, but with peripheral capability added. Available peripherals include a magnetic card reader, cassette tape drives, and printers of the B 9249 series.

COMMUNICATIONS CONTROL

B 1351 SINGLE-LINE CONTROL: Provides the interface between a single leased or switched communications line ►

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▶ and any B 1900 Series processor. The maximum number of single-line controls that can be connected to a B 1905 processor is two. Each control must be equipped with an appropriate line adapter. Line adapters, as listed below, permit communication with teletypewriter terminals and with the full range of Burroughs computers and terminal equipment.

The B 1351-1/-80 Single-Line Control can utilize any adapter listed below except the B 1667-5/-85, while the B 1351-2 Single-Line Control has a universal adapter that handles all connections except Burroughs direct interface at up to 19,200 bps, Burroughs standard synchronous at up to 4800 bps or 9600 bps, and bisynchronous at up to 50,000 bps.

LINE ADAPTERS: Burroughs offers 16 different line adapters, divided between asynchronous, direct connect, synchronous, wideband, and automatic calling models. They can be summarized as follows:

Asynchronous data set adapters: B 1650/-81—up to 1200 bps, connection types II, III, or IV; B 1650-2/-82—up to 1800 bps, connection type V; and B 1652-1/-81—Teletype, connection type II.

Direct connect adapters: B 1650-5/-85—two-wire, up to 2400 bps; B 1650-6/-86—two-wire, up to 4800 bps; B 1650-7/-87—two-wire, up to 9600 bps; B 1652-5/-85—Teletype, all the above with connection type II; and B 1667-2/-82—Burroughs Direct, up to 19,200 bps, connection type X.

Synchronous data set adapters: B 1651-1/-81—Burroughs standard, up to 2400 bps, connection type VI or VII; B 1651-2/-82—Burroughs standard, up to 4800 bps, connection type VIII; B 1651-3/-83—Burroughs standard, up to 9600 bps, connection type XII; B 1653-1/-81—bisync, up to 2400 bps, connection type VI or VII; B 1653-2/-82—bisync, up to 4800 bps, connection type VIII; and B 1653-3/-83—bisync, up to 9600 bps, connection type IX.

B 1352-2/-82 Wideband Data Set Adapter—bisync, up to 50,000 bps with connection type XI.

B 1667-5/-85 Automatic Calling Unit Adapter—connects with up to four Bell 801 Automatic Calling Units or three Bell 801 Automatic Calling Units and one in-built data set automatic calling unit.

Connection type I is a standard two-wire direct interface without a data set. Connection types II and III are a Western Electric 103A Data Set or equivalent with either an asynchronous switched line up to 150 bps (type II) or an asynchronous unconditioned lease line with capabilities up to 300 bps (type III). Western Electric 202C Data Sets with an asynchronous switched line up to 1200 bps form the type IV connection. TA 713 or TA 783 Data Sets or equivalent along with an asynchronous unconditioned leased line with capabilities up to 1800 bps form the type V connection. Type VI and VII connections consist of a TA 734-24 data set or equivalent and either a 2000-bps synchronous switched line (type VI) or an unconditioned 2400-bps synchronous leased line (type VII). A synchronous CI conditioned 4800-bps leased line and TA 734-48 Data Set or equivalent form type VIII connection. A type IX connection is composed of a 9600-bps synchronous leased line and Rixon DS9601 Data Sets. No data set is required for a type X connection, which is a Burroughs direct interface (BDI). A type XI connection consists of a WE303 and leased wideband service.

B 1351-1/-81 DUAL SINGLE-LINE CONTROL: Provides the interface between two leased or switched communications lines and a B 1900 Series processor. Otherwise similar to the B 1351 Single-Line Control.

B 1352 EIGHT-LINE MULTI-LINE CONTROL: Provides the interface between B 1955 or B 1985 processors and up to eight leased or switched communications lines.

With the 1353 Controller Extension, a total of up to 16 lines can be serviced. The 1352 MLC must be equipped with an appropriate line adapter for each line. Line adapters permit communication with Teletype terminals and with the full range of Burroughs computers and terminal equipment. Transmission speeds up to 9600 bits/second can be handled in either asynchronous, synchronous, or binary synchronous mode. Wideband transmission is possible at up to 50,000 bps. The transmission code is 7-bit ASCII plus parity.

The 1352 MLC interfaces directly with main memory through the Port Interchange, thereby reducing the demands it imposes upon the central processor. Although the MLC performs numerous communications control functions and operates in a largely processor-independent manner, it is a hard-wired controller rather than a programmable communications processor. One character of buffering per adapter is provided in the MLC, in addition to the one character accumulated by the buffer.

A B 1955 or B 1985 system can include a maximum of two B 1352 MLC's, each equipped with a 1353 Controller Extension, for a maximum total of 32 lines.

B 1354 FOUR-LINE MULTI-LINE CONTROL: Similar to the B 1352, but restricted to four lines. No extension is available to increase the B 1354's capacity.

B 1360 DATA COMMUNICATIONS PROCESSOR (DCP-1): Used only in B 1955 systems utilizing the Computer Management System (CMS) software for compatibility with the smaller Burroughs B 80, B 90, and B 800 computers, the DCP-1 is a communications processor with 16K bytes of N-channel MOS memory. A maximum of three DCP-1's can be connected to a B 1955 system, and each DCP-1 can control up to seven communications lines. A B 1660 DCI Adapter is required for each line. The basic DCP-1 accommodates up to three DCI Adapters, and addition of the B 1365 DCP-1 Extension permits up to four more DCI Adapters to be used. Each DCI Adapter can handle any of the types of connections described above under "Line Adapters" except wideband communications and connections to Teletype equipment.

SOFTWARE

OPERATING SYSTEMS: The B 1900 Series announcement included two new operating systems which bring together the software capabilities required for both conventional data processing and on-line transaction processing.

MCP-TCS III (Master Control Program—Transaction Control System III) is the required operating system for all B 1905 computer systems. It consists of the Master Control Program (MCP) for overall system control; the Network Definition Language (NDL) for generating communications control programs; the ODESYS on-line data entry system; either the Text Editor or CANDE for on-line programming and/or file updating; the user's choice of one compiler; and system utilities to handle sorting and other routine operations.

MCP-TCS IV is the required operating system for all B 1955 and B 1985 computer systems. It includes all the facilities of MCP-TCS III plus the Generalized Message Control System (GEMCOS) and either the DMS-II data base management system or the Reporter System for generating customized report programs.

The components of MCP-TCS III and MCP-TCS IV are individually described below.

CM-TCS (Computer Management—Transaction Control System): This alternative set of systems software is designed for use in B 1955 installations that need to maintain program compatibility with the Computer Management System (CMS) software used on the smaller Burroughs B ▶

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► 80, B 90, and B 800 Series computers. CM-TCS consists of the following components: Master Control Program, CANDE, ODESYS, NDL, CMS COBOL or RPG Compiler, and system utilities. The B 1360 Data Communications processor (DCP-1) is required in all B 1955 systems using the CM-TCS software; it can be configured in place of the standard B 1352 Multi-Line Communications Control.

Master Control Program: The MCP is a modular operating system that manages and controls all operations of the system. It performs the following principal functions: 1) schedules the loading and execution of user programs in a multiprogramming environment, in accordance with user-assigned priorities; 2) allocates memory areas, processor logic, and peripheral units; 3) schedules and initiates all I/O operations; 4) provides automatic error-handling procedures; 5) creates and maintains a disk program library; 6) handles communication between the system and its operator via the console typewriter and control cards; 7) provides a printout showing the status of all active jobs upon request; 8) guides the compilation of programs written in COBOL, FORTRAN, BASIC, and RPG; 9) handles file opening and closing, physical data management, utility functions, program loading, and program library calls; and 10) controls data communications devices and MICR reader-sorters.

The MCP is written in Burroughs' Software Development Language (SDL), a high-level language oriented toward facilitating the writing of systems software. Therefore, whenever the MCP is in use, all or part of the SDL Interpreter must be resident in memory.

The MCP requires a minimum of 28K bytes of memory plus the memory space required to hold the users' programs. Required peripheral equipment includes a display console, dual disk pack drive unit, and line printer.

A new release of the MCP, Level 9.0, is scheduled to be distributed with the first volume deliveries of the B 1900 systems in the first quarter of 1980. According to Burroughs, the new version will deliver performance improvements of up to 20 percent, depending upon the job mix and the software utilized.

LANGUAGES: The B 1900 Series computer systems support COBOL, RPG, FORTRAN, BASIC, Audit Entry Language, Micro Implementation Language, Software Development Language, Network Definition Language, and User Definition Language.

The *B 1900 COBOL* language is an essentially complete implementation of full American National Standard 1974 COBOL except for the Report Writer module, which is omitted from the B 1900 version. COBOL object programs are regarded as a collection of logical segments which can be loaded and executed individually or in groups, meaning that programs can be written without the usual limitations imposed by the computer's memory capacity.

The COBOL compiler runs on any B 1900 system. The compiler requires about 40K bytes of memory. Object programs generated by the COBOL compiler are expressed in an S-language that is oriented toward efficient handling of 4-bit digits and 8-bit characters. The COBOL Interpreter, required at execution time, occupies about 3K bytes of memory in addition to the object program's requirements.

B 1900 COBOL includes a queue handling technique and a sort capability that includes a tag search, a restart facility, vertical collating sequence, and tape sorting.

The *B 1900 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 1800 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 1900 system. The compiler requires about 10K bytes of memory exclusive of MCP. The RPG Interpreter occupies about 3K bytes of memory at execution time in addition to the object program's requirements.

The *B 1900 FORTRAN* language is compatible with American National Standard 1977 FORTRAN and includes certain Burroughs extensions to provide features available in IBM FORTRAN IV Level II. The compiler requires about 48K bytes of memory. Object programs produced by the FORTRAN compiler are expressed in an S-language that is oriented toward efficient handling of 36-bit "words" and 72-bit "doublewords." The FORTRAN Interpreter, required at execution time, occupies about 3.5K bytes of memory in addition to the object program's requirements.

B 1900 BASIC is a language that generally corresponds to the original Dartmouth BASIC (Beginners' All-Purpose Symbolic Instruction Code). Burroughs offers both a batch-mode BASIC compiler and an Interactive BASIC System for the B 1900 Series computers.

The batch-mode BASIC compiler requires a minimum of 12K bytes of memory exclusive of MCP requirements. Object programs produced by the BASIC compiler are expressed in an S-language that is oriented toward efficient handling of 40-bit (5-character) "words." The BASIC Interpreter, required at execution time, occupies about 3K bytes of memory in addition to the object program's requirements.

The Interactive BASIC System accepts commands, program instructions, and data values from users at local or remote terminals. Commands cause the requested functions to be performed immediately; program instructions are stored for later execution; and data values are entered in response to program requests. The results of each program are routed to the originating terminal. The BASIC source language is converted to an internal form that can be efficiently executed on a B 1900 system. Extensive text editing and debugging facilities are provided to facilitate programming. Burroughs' Interactive BASIC language includes all the facilities of ANSI's Minimal BASIC plus enhancements in these areas: string handling, array handling, mathematical functions, external file handling, and formatted output. Memory requirements of the Interactive BASIC System have not been specified to date.

The *B 1900 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. 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.

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 speci- ►

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► fication. All error messages may be defined by the programmer and displayed any place on the screen at the programmer's option.

AEL also includes 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. 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.

B 1900 Micro Implementation Language (MIL) is a compiler-level language that produces micro-code that is directly executable on a B 1900. Register-to-register operations; variable-length operations; bit field extraction; control memory overlay; and shift, rotate, and compare functions are possible. Read/Write/Swap of 1 to 24 bits forward or backward in main memory, with incrementing and decrementing of length attributes, is performed in one microinstruction. Scratchpad storage of main memory pointers and a 16- or 32-level pushdown stack for micro-code return linkage are addressable. To use MIL, a knowledge of gating functions of timing of hardware events is not required. A single microinstruction will bias the micro-processor mode for data type, which may be binary, 4-bit decimal, or EBCDIC. Data field length can be from one to 65,536 bits. MIL requires 44K bytes of memory exclusive of MCP.

B 1900 Software Development Language (SDL) is a compiler-level system language that is procedure-oriented with extensive subscripting, indexing, and data concatenation capabilities. Data declarations include arrays and substructures in bit or character formats. Data space can be allocated as permanent, dynamic (shared space local to procedures), and virtual. Dynamic space is calculated at run time. SDL requires 20K bytes of memory exclusive of MCP.

Network Definition Language (NDL) is a special-purpose programming tool that enables users to define and generate customized Network Control programs for data communications applications. The Network Controller handles line disciplines, buffer management, message queuing, and auditing, and supervises the flow of messages between user-coded programs and remote terminals. This enables the user's application programs to deal with remote terminals in the same manner as with conventional on-site peripheral devices. After the programmer defines his custom Network Controller in the NDL syntax, the source statements are processed by the NDL Compiler and converted into the necessary object code and tables. NDL runs under MCP on any B 1900 Series system. NDL requires a minimum of 12K bytes of memory exclusive of MCP.

User Programming Language (UPL) is an ALGOL-like compiler language designed to facilitate the solution of complex logic and decision-making problems, primarily in the design of data communications message control programs. UPL is a procedure-oriented language with extensive subscripting, string manipulation, and data concatenation facilities. Arrays and data substructures can be defined in or character formats. The UPL Compiler and its object programs operate under MCP supervision on a B 1900 Series system. UPL can be used to prepare a customized Message Control System (MCS) for use with an NDL-generated Network Controller when the user wishes to exert control over system decisions such as security, file control, error handling, preprocessing, or postprocessing. UPL requires a minimum of 20K bytes of memory exclusive of MCP.

GENERALIZED MESSAGE CONTROL SYSTEM (GEMCOS): GEMCOS is a generalized system that uses parameters for generating an installation-tailored Message Control System (MCS). The Message Control System (MCS) provides the interface between the network con-

troller and user application programs by decoding and directing incoming messages to the appropriate user program for processing. The system can accommodate user-written code and contains facilities for exchange of data between application programs. Recovery capabilities include dynamic restoration of the network configuration, an audit mechanism for logging specified messages, and a network control command for orderly system shutdown in the event of system failure. The recovery mechanism can be synchronized with DMS II recovery to insure data base integrity. A password security system is provided to control access to the communications network. The system also includes an auxiliary program to permit network commands to be entered into the MCS from the console printer or a card reader. GEMCOS also provides a transaction translation feature which translates data from the format required by the workstation to the format required by the application program.

GEMCOS requires a minimum of 24K bytes of main memory for Message Control Program generation (not including MCP and Network Definition Language memory requirements), plus a console printer, card reader, line printer and 4.6 million bytes of disk storage, exclusive of MCP and NDL requirements. Each MCS requires a minimum of 7K bytes of memory plus 5K bytes of disk storage.

DATA MANAGEMENT SYSTEM II: DMS-II is a data base management system consisting of two components: a Data and Structure Definition Language (DASDL), which provides for the logical description of data sets or subsets and for mapping the logical data onto physical structures, and a COBOL interface.

Specifically, B 1900 DMS-II is a logical subset of B 6700/6800 DMS-II. The COBOL constructs used in B 1900 Series COBOL programs for accessing the data base are syntactically and semantically compatible with those used in B 6700 COBOL. However, the physical mapping algorithms for structuring the data base records on direct-access storage differ, so that a B 1900 DMS-II data base must be reloaded before being transferred to B 6700 DMS-II. The B 1900 DMS-II DASDL parameters and DMS statements in COBOL programs are compatible with B 6700 DMS-II, eliminating the necessity of converting DMS-II COBOL user programs and user DASDL or the DASDL definition of the data base.

DMS-II Inquiry provides access to a data base from any terminal. In addition to extracting information from the data base, DMS-II Inquiry allows the terminal user to interrogate the description of a data base. Inquiry statements are composed of basic functions tied together by English-like connectors. Inquiry statements include HELP, which provides information to the user on how to use Inquiry; SHOW, which allows the user to list on a terminal all or selected portions of a data base; REPEAT, which allows the user to repeat a previous statement; EDIT, for modification of a previous statement; GENERATE, for creation of a private copy of a portion of a data base; DEFINE, for creation of statement abbreviations; and INQUIRY, which provides a means of selecting records of interest and naming the information to be displayed.

DMS-II requires 128K bytes of memory for operation; this includes space for MCP, the network controller, and DMS-II. Additional users of the same data base will require 32K bytes each. For further information on DMS-II see Report 70E-112-01.

COMMAND AND EDIT (CANDE): Provides generalized file preparation and updating in an interactive terminal-oriented environment. B 1900 CANDE is a subset of B 6700 and B 6800 CANDE and conforms to the same functional behavior. B 1900 CANDE is an MCS (Message Control System) that runs in conjunction with NDL. The NDL-generated network controller performs all the data communications related functions, while CANDE performs file updating and text editing functions. CANDE can support

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► a maximum of 16 terminals and makes optimum use of Model 33 teletypewriters and TD 83X CRT's. A basic user code/password type of security is available with the system. CANDE also provides a recovery system. CANDE requires 22K bytes of memory for one terminal plus 2K bytes for each additional terminal when specific file functions such as "GET" are used. MCP and NDLE are not included in the memory requirements of CANDE.

REPORTER: The Reporter System enables users to generate customized report programs from simplified free-form statements describing the contents of the reports to be produced. Its output is COBOL source code, ready for compilation and execution on either a one-shot or production basis. Reports can be created from information contained in standard disk, tape, or card files or from data base files created by DMS-II. To describe the files and generate the necessary vocabulary (a one-time operation), VOCAL (Vocabulary Language) allows direct reference to COBOL data names and file layouts in existing COBOL source programs; alternatively, the data names and descriptions can be entered separately in standard COBOL notation.

The reports to be reproduced are described in a concise, English-like language, called REPORTER, that is largely self-documenting. Numerous default features make it unnecessary to specify each option. The user specifies each data element by name only, and is not required to know its size or format. In similar fashion, the user need only specify the column headings, and the system will automatically handle all other aspects of formatting the output. A security system denies access to sensitive data items by unauthorized users. Through an interface module, the reports can be generated from and viewed at remote workstations. The Reporter System requires 25K bytes of memory and 2 megabytes of disk storage.

B 1900 TEXT/EDITOR (TEI): This remote text editing program runs under control of the MCP operating system and provides facilities for source file maintenance operations concurrently with batch and other remote processing. The system provides a conversational English-language command language which includes editing, manipulation, and control commands that can be entered from TD 700 or TD 800 series remote terminals. Each terminal user is provided with a re-entrant copy of the Text/Editor program in order to insure effective response. The Text/Editor requires at least 9.1K bytes of memory exclusive of MCP, network controller, and message buffer space.

A wide range of data sampling techniques is supplied with TEI, including systematic, tandem, and stratified. Selection of data can be based upon weighting and validation criteria, pattern matching, arithmetic expressions, and range intervals. Statistical parameters can be automatically calculated.

SYSTEM COMMUNICATION MODULE (SYCOM): Provides a mechanism for linking two B 1900, B 1800, or B 1700 computers to permit file transfers, remote execution from the console keyboard, and program communication between the systems. SYCOM contains its own data communications handler and operates under MCP control, permitting the SYCOM functions to be combined with on-site work in a multiprogramming job mix. SYCOM operates in point-to-point mode via a switched or leased communications line. Available features include auto answer, auto call, EBCDIC transparent and nontransparent, space compression/expansion, and buffer sizes ranging from 405 to 4095 bytes. The SYCOM program requires a minimum of 20K bytes of main memory plus a single-line, dual-line, or multi-line communications control with a standard synchronous, binary synchronous, or direct-connect adapter.

HASP REMOTE TERMINAL PROGRAM: Permits a B 1900 Series system to function as a remote batch terminal on-line to IBM System/360 or 370 computer systems that

utilize the HASP Binary Synchronous Multileaving Protocol. With the HASP Remote Terminal Program, a B 1900 system can be made functionally equivalent to a standard IBM 360/20 HASP workstation. Communication between the B 1900 and the central system are conducted utilizing the standard IBM binary synchronous line procedures. The transmission code is EBCDIC. Two modes of operation are supported. In the Spool Mode, input data from the B 1900 peripheral devices is compressed, blocked, and stored on a disk file for later transmission to the central processor, and data records returned from the central system are stored on disk for subsequent output to printers or card punches. In the Direct Mode, input data is blocked and transmitted to the central system, and data records returned from the central system are immediately deblocked and routed to the appropriate output devices.

The B 1900 HASP Remote Terminal Program operates under the MCP operating system, permitting the remote job entry function to be multiprogrammed with local processing. Line speeds of up to 9,600 bps are supported over leased or dial-up lines in half-duplex mode. The program requires 32K bytes of main memory in addition to that required for MCP.

RJE TERMINAL PROGRAMS: Burroughs offers two programs for RJE. One permits entry to a B 6000/B 7000; the second, to a B 2000/B 3000/B 4000. These programs make a B 1900 appear as a remote terminal to the above systems and enable direct entry to the host computer with printer or punch output returned. Both programs require either 16K or 24K bytes of memory, dependent on the user selection of Network Definition or Systems Definition Language versions.

BURROUGHS NETWORK ARCHITECTURE (BNA): A set of software facilities designed to enhance the interaction of terminals with host CPU's in a network environment, BNA is also designed to facilitate a move into distributed data processing. Through the new architecture, Burroughs processors and terminals can be granted access to data bases throughout a network, job tasks and information files can be transferred from one point to another, and data processing resources available in a network can be shared among participants regardless of location. BNA is designed to work with existing Burroughs terminal networks and with the Global Memory multi-processing facility available on Burroughs large-scale processors. BNA depends on logical links rather than physical links, relying on network tables maintained in the host processors for routing. All routing is through host mainframes. Services provided by BNA include those designated host and those designated network. Host services include coordination of communication between tasks being executed at various hosts; control of the creation, updating, and transfer of data from host to host; and handling of communication with logical points within the network. Network services perform message routing, linking hosts using the Burroughs Data Link Control (BDLC) bit-oriented protocol. Network services also permit connection of Burroughs processors to packet-switching services using X.25 procedures. Links can also be established to non-Burroughs machines using currently available software such as NDLE and MCS.

BURROUGHS DATA LINK CONTROL: Until the adoption of BDLC, a bit-oriented line control procedure for synchronous transmissions, Burroughs' protocol was Basic Mode, a character-oriented line control procedure. In the Basic Mode protocol system, the user data was "enveloped" or bracketed by line control characters before transmission.

In BDLC, the data is bracketed with a lesser number of characters because bits, rather than whole characters, are used to represent the control codes. This reduction in non-information control data transmitted with user data is significant despite the addition of transmission error detecting control bits. ►

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► **BDLC** is based on High-Level Data Line Control Procedures (HDLC), the protocol standard developed by the International Standards Organization (ISO) and by the European Computer Manufacturers Association (ECMA), and Advanced Data Communications Control Procedures (ADCCP), the protocol standard developed by the American National Standards Institute (ANSI). It is Burroughs' intention to maintain BDLC compatible with the bit-oriented protocols of selected competitors (such as IBM's SDLC).

In networks using BDLC, one device, a processor, operates as a Primary Station. All other devices, whether processors or terminals, function as Secondary Stations. (This arrangement is referred to as the Unbalanced Configuration.) Any line can be full- or half-duplex, switched or non-switched, analog or digital. In the point-to-point arrangement, the Primary Station is at one end of a communications line, and a Secondary Station is at the other end. In the multi-point arrangement, the Primary Station is at one end of the line and two or more Secondary Stations are connected to the line. A device can function as a Secondary Station on one line and as a Primary Station on another line. Such an arrangement can occur when a given Secondary Station has one line to a Primary Station and another line to devices that are not connected to that Primary Station.

The Primary Station controls the establishment of links for data transfer, controls the actual data transfer, and controls error recovery operations. The Secondary Stations can operate in the Normal Response Mode (NRM) or in the Asynchronous Response Mode (ARM). In the Normal Response Mode, the Secondary Station cannot initiate transmissions. Specific permission to transmit and/or respond to a command must be given to the Secondary Station by the Primary Station. Once given permission, a Secondary Station can transmit up to seven frames (messages) without requiring additional permission. In an optional version of BDLC, up to 127 frames can be transmitted without requiring additional permission.

In the Asynchronous Response Mode, the Secondary Stations can initiate transmission without permission from the Primary Station. In this mode, Secondary Stations on a multi-point line must contend with each other to obtain a link for transmission. In the NRM, the Primary Station polls each station and thereby assures each station equal opportunity for link establishment.

ON-LINE DATA ENTRY SYSTEM (ODESY): A sophisticated data entry and validation system using multiple on-line visual display units, ODESY provides a generalized and generative "front end" for the existing B 1900 application packages. It enables future packages to be designed to use its extensive editing facilities and thus reduce development effort by virtually eliminating conventional input control programs. Because of these editing facilities, ODESY is able to produce batches of essentially error-free data for input to application programs.

DISK-FORTE II: A file management system that enables a user to structure and maintain data files in disk storage. The files may have any of four distinct types of organization: indexed sequential, random, indexed random, and indexed sequential-grouped. Appropriate search strategies are used to access the data records in each type of file. "Pointers" can be defined to establish chaining and linking network structures among the files. Disk-FORTE II generates COBOL source code which is compiled along with the user's application programs. Disk-FORTE II requires a minimum of 24K bytes of memory.

TIME AND ANALYSIS BILLING SYSTEM (TABS): Designed to provide B 1900 system users with a comprehensive analysis of the SYSTEM/LOG, which is automatically maintained by the MCP, TABS provides information for system mix and peripheral utilization reports, program execution reports, and services-rendered reports. The automatic logging function of the MCP

creates the SYSTEM/LOG, which contains information about all significant events in a multiprogramming system. The analysis function of TABS extracts and generates machine utilization statistics and program performance. As the selected reports are produced, month-to-date statistics are maintained in TABS data files. The statistics, together with information on installation costs supplied by the user, can be used to distribute the system cost equitably among individuals, departments, or applications using the data processing services. TABS requires a minimum of 20K bytes exclusive of MCP.

B 100/200/300/500 INTERPRETER: Enables any B 1900 Series system to execute object programs written for the second-generation Burroughs B 100, 200, 300, or 500 Series computers. The Interpreter is essentially a microcoded B 300 Series instruction set that has been implemented in the variable micrologic of the B 1900 Series. The following B 300 Series peripheral devices are directly replaced by their B 1900 Series counterparts: 80-column card readers and punches, buffered line printers, magnetic tape units, disk files, and the supervisory printer. On-line banking systems, data communications terminals, MICR reader-sorters, and 6-tape listers, however, are not supported.

IBM 1401, 1440, 1460 INTERPRETER: Enables any B 1900 Series system to execute object programs written for an IBM 1401, 1440, or 1460 computer. The Interpreter is essentially a microcoded IBM 1400 Series instruction set that has been implemented in the variable micrologic of the B 1900 Series. The Interpreter supports most of the 1401/1440/1460 processor functions and all of the standard peripheral equipment except MICR, OCR, paper tape, and data communications devices.

IBM 1130 INTERPRETER: Decodes and executes 1130 programs on the B 1900 under control of MCP in an 1130 environment. The Interpreter can be multiprogrammed with any standard B 1900 object program. I/O instructions for the 2501 Card Reader, 1403 Printer Models 6021, 2310 Disk Storage Models 1 or B 2, 1131 Console Printer and Keyboard, 1132 Line Printer, and 1442 Card Reader can be executed. The interpreter requires 16K bytes plus the memory size of the IBM 1130, exclusive of MCP.

CONVERSION AIDS: In addition to emulators, Burroughs offers the following language translators as aids for converting from competitive computer systems: Honeywell Easycode to B 1900 COBOL, NCR Century Series COBOL to B 1900 COBOL, IBM Autocoder to B 1900 COBOL, NCR NEAT/3 to B 1900 COBOL, B 300/B 500 Assembly Language to Burroughs COBOL, and Honeywell COBOL to B 1900 COBOL.

UTILITY ROUTINES: A disk sort program sorts records into ascending or descending sequence in accordance with specification cards that describe the input and output files, the key field or fields, and various options. The sort function can also be invoked from within a COBOL or RPG source program. The user can specify either of two sorting techniques; vector replacement (the one most commonly used) or in-place (which minimizes the amount of disk storage space required).

The systems SORT provides for both sorting or merging utilizing tape or disk. The program requires 3K bytes of memory for the sort generator, 8K bytes for the tape, disk, or in-place sort, and 8K bytes for the merge. User options in using the sort utility include sorting technique, memory allocation, and percentage of byte in order.

Other B 1900 Series utility routines include System Loading Procedures, Disk Cartridge Initializer, Disk File Copy, Memory Dump, Memory Dump Analyzer, File/Loader, File/Puncher, and DMPALL. The last-named routine is a flexible listing and reproducing program for printing the contents of files and transcribing data from one medium to another. ►

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► **AUDIT ENTRY HOST SYSTEMS UTILITIES (AEU):** A set of utilities provided to complement the AEL language and provide a link between AEL machines and the host B 1900. AEU routines load the files from the host system ICMD device or from the data communications link. File manipulation facilities are also provided by these utilities. The host utilities include Batch Load, for loading AEL-produced files from a host peripheral; Concatenate, to combine a number of AEL produced files; Remote Load, which allows files to be received at a host system after transmission from an AEL machine and visa versa; Reformat, which allows the sequence of fields in an AEL record to be altered subsequent to the file being loaded in the host; and File Maintenance, for record insertion, deletion, and replacement on AEL produced files. These utilities require a minimum of 22K bytes of memory, exclusive of system software.

APPLICATION PROGRAMS: See the Software Prices section at the end of this report for a listing of applications programs available for the B 1900 Series.

PRICING

CONTRACT TERMS: The B 1900 equipment is available for purchase or under Burroughs' standard equipment lease agreement which includes equipment maintenance and entitles the customer to unlimited use of the equipment. The standard agreement covers maintenance of the equipment for eight consecutive hours a day, Monday through Friday. The CPU is warranted for one year; the other equipment, for 90 days.

In addition to the standard 1-year lease, Burroughs offers 3-year and 5-year leases at prices approximately 10 and 15 percent lower, respectively, than the 1-year lease prices.

All lease plans may include purchase options which allow 50% of the rental paid during the first 36 months to be applied toward the purchase price at any time during the lease period.

A 10% education discount is offered.

MAINTENANCE: In addition to the standard maintenance agreement, a user with a purchased or leased unit can elect extended maintenance by adding to the monthly

charges the percentage given by the following table. All maintenance rates given in this report are for metro 1 (city) districts. Super city rates (e.g., New York or Chicago) are four percent higher. Rates outside a metro area (10 miles from city) are 20 percent higher.

For purchased systems not under maintenance contract, the user charges are as follows:

	<u>Rate</u>	<u>Minimum</u>
Mon. through Fri., 8 AM to 5 PM	\$40/hr.	1 hour
All other times	\$48/hr.	2 hours

SOFTWARE: All software is unbundled and separately priced under Burroughs' Program Products plan. The Program Products are offered under either an Unlimited-Time License Plan, for a one-time charge followed by an annual maintenance fee, or a Limited-Time License Plan, with monthly payments during a 3-year lease term. The available Program Products and their associated license fees are listed under "Software Prices" at the end of this report.

TECHNICAL SUPPORT: B 1900 users can purchase Burroughs technical assistance in four ways: (1) as part of a Business Management System (see "Software Prices"); (2) under a System Analyst Assistance Agreement, for \$2,000 per year; (3) on a per-diem basis, when available, for \$150 per day; or (4) by the hour at \$50 per hour.

EDUCATION: B 1900 users can obtain the necessary training: (1) as part of a Business Management System (see "Software Prices"); or 2) by paying for individual courses. The separately priced courses announced to date range from 3 to 8 days in length and cost \$100 per day for each attendee.

DEBUGGING TIME: One hour per \$1,000 of rental or per \$48,000 of purchase price, not to exceed 120 hours.

EQUIPMENT: The components and prices of the packaged B 1900 Series systems are listed in the "Equipment Prices" section, which follows. Downgrading or substitution of items with lower list prices is not allowed. Substitution of similar items with higher prices may be made by adding the current price differentials to the basic package price.■

EQUIPMENT PRICES

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>1-Year Lease*</u>	<u>5-Year Lease*</u>
PACKAGED SYSTEMS					
B 1905	Basic system; includes 4-MHz CPU with 131K bytes of main memory, built-in Universal Disk Controller, B 9348-52 Display Console, B 1348-52 Console Control, B 1486-1 Disk Control, B 9484-2 Dual Disk Pack Drive (65 megabytes), B 1249 Printer Control, B 9246-3 320-lpm Line Printer, and B 1351-2 Universal Single-Line Control	\$ 71,500	\$410.00	\$2,440	\$2,090
B 1955	Basic system; includes 6-MHz CPU with 524K bytes of main memory, built-in Universal Disk Controller, B 9348-52 Display Console, B 1348-52 Console Control, B 1486-1 Disk Control, B 9484-2 Dual Disk Pack Drive (65 megabytes), B 1249 Printer Control, B 9246-6 650-lpm Line Printer, and B 1352 8-Line Multi-Line Control	104,000	540.00	3,531	3,025
B 1955-1	Same as B 1955 basic system except that the B 9484-2 Dual Disk Pack Drive, B 9246-6 Line Printer, and B 1249 Printer Control are omitted	87,450	335.00	2,770	2,373
B 1985	Basic system; includes two 6-MHz CPU's, 524K bytes of main memory, built-in Universal Disk Controller, B 9348-52 Display Console, B 1348-52 Console Control, B 1486-1 Disk Control, B 9484-5 Dual Disk Pack Drive (130 megabytes), B 1249 Printer Control, B 9246-6 650-lpm Line Printer, and B 1352 8-Line Multi-Line Control	148,960	648.00	4,824	4,133
B 1985-1	Same as B 1985 basic system except that the B 9484-5 Dual Disk Pack Drive, B 9246-6 Line Printer, and B 1249 Printer Control are omitted	125,840	430.00	3,969	3,400

*Includes equipment maintenance.

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EQUIPMENT PRICES

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>1-Year Lease*</u>	<u>5-Year Lease*</u>
PROCESSOR OPTIONS					
B 1057	Power Booster	5,925	17.00	185	155
B 1058	Expansion Cabinet	16,223	68.00	524	453
ADD-ON MAIN MEMORY					
B 1005-131	131K-byte increment for B 1905 only	3,450	15.00	110	95
B 1155-262	262K-byte increment for B 1905, B 1955, B 1955-1, B 1985, or B 1985-1	5,750	23.00	185	155
MASS STORAGE					
B 1486-1	Disk Pack Drive Control	6,365	54.60	207	170
B 9484-25	Dual Disk Pack Drive and Controller; 62.5 megabytes	32,960	100.00	1,092	845
B 9484-55	Dual Drive/Controller; 130.4 megabytes	43,073	100.00	1,411	1,083
B 9484-5	Add-on drive for the B 9484-55 or B 9499-6; 130.4-megabytes dual disk pack drive	20,000	85.00	670	545
B 9494-2	Add-on drive for the B 9484-55 or B 9499-6; 201-megabyte fixed disk drive	16,000	65.00	444	345
B 9494-4	Add-on drive for the B 9484-55 or B 9499-6; 402-megabyte dual fixed disk drive	24,000	95.00	665	504
B 9489-17	Industry Compatible Mini-Disk Drive; single spindle, 243K bytes	3,296	22.10	113	103
B 9489-16	Industry Compatible Mini-Disk Drive; dual spindle, 486K bytes	6,530	25.00	221	180
B 1489/-80	Mini-Disk Control for the B 9489-17 and B 9489-16	4,244	12.30	128	106
MAGNETIC TAPE UNITS					
B 9490-25	Cassette Tape Station; 10 ips	1,689	8.90	69	56
B 1490-25	Control for the B 9490-25 Cassette Tape Station	2,334	46.80	106	79
B 9495-7	Magnetic Tape Drive; 9-track, 20/40 KBS, NRZI/PE	9,000	85.10	320	235
B 9495-8	Magnetic Tape Drive; 9-track, 40/80 KBS, NRZI/PE	10,000	90.40	350	285
B 9495-82	Magnetic Tape Drive; 9-track, 60/120 KBS, NRZI/PE	17,600	88.10	555	430
B 9495-41	Magnetic Tape Subsystem; 1 x 4 B 9499-33 Master Electronics Unit and 40 KBS B 9495-7 Magnetic Tape Drive	11,700	85.00	360	295
B 9495-42	With two drives	20,700	140.00	680	560
B 9495-45	Magnetic Tape Subsystem; 1 x 4 B 9499-33 Master Electronics Unit and 80 KBS B 9495-8 Magnetic Tape Drive	13,500	95.00	420	345
B 9495-46	With two drives	23,500	165.00	770	630
B 9499-33	1 x 4 Master Electronics Unit; PE; for B 9495-7 or B 9495-8	10,400	25.80	340	260
B 9499-34	1 x 8 Master Electronics Unit; PE; for B 9495-7 or B 9495-8	11,200	25.80	365	285
B 9499-35	2 x 8 Master Electronics Unit; PE; for B 9495-7 or B 9495-8	13,120	56.60	430	330
B 9499-50	1 x 4 Master Electronics Unit; PE; for B 9495-82	16,500	110.00	545	415
B 9499-51	1 x 8 Master Electronics Unit; PE; for B 9495-82	18,200	110.00	575	440
B 9499-52	2 x 8 Master Electronics Unit; PE; for B 9495-82	46,478	230.00	1,640	950
B 9999-4	PE/NRZI Switchable Feature; allows B 9495-7, -8, or -82 to operate in NRZI mode	750	4.20	25	20
B 9999-5	NRZI Option; for use with B 9499-33, -34, -35, or -52	2,600	25.00	80	65
B 1495-32	PE/NRZI Control; for use with B 9499-50, B 9499-51, or B 9499-52	3,600	17.00	95	86
B 1491-30	NRZI Control; for use with B 9499-33, B 9499-34, or B 9499-35	6,000	57.00	175	159
B 1495-35	PE/NRZI Control; for use with B 9499-52	10,200	67.00	270	245
LINE PRINTERS					
B 9246-3	Band Printer; 320 lpm, 132 positions	11,500	125.00	380	310
B 9246-6	Band Printer; 650 lpm, 132 positions	14,000	150.00	475	365
B 1249/-80	Printer Control for the B 9246 Band Printers	1,379	11.00	54	54
B 9247-16	Train Printer; 750 lpm, 132 positions	20,000	200.00	650	525
B 9247-14	Train Printer; 1100 lpm, 132 positions	33,000	349.00	1,100	815
B 9247-15	Train Printer; 1500 lpm, 132 positions	44,000	400.00	1,500	1,200
B 1247/-80	Printer Control for the B 9247-12 or B 9247-16	4,584	21.70	116	101
B 1247/-84	Printer Control for the B 9247-14	5,729	31.30	160	128
B 1247/-85	Printer Control for the B 9247-15	7,957	29.30	260	217
B 9942-9	Additional Train Module for the B 9247-12 or B 9247-13	3,605	28.00	84	69
B 9942-10	Additional Train Module for the B 9247-14 or B 9247-15	3,245	28.00	124	101
B 9249-1	Chain Printer; 85 lpm, 132 positions	8,755	82.90	335	268
B 9249-2	Chain Printer; 160 lpm, 132 positions	9,270	96.60	381	304
B 9249-3	Chain Printer; 250 lpm, 132 positions	12,875	130.00	525	412
B 9249-4	Chain Printer; 350 lpm, 132 positions	14,900	137.00	610	480
B 1249/-80	Printer Control for the B 9249 Chain Printers	1,379	11.00	54	54
B 9948-1	12-channel VFU for the B 9249 Chain Printers	618	16.10	41	26

*Includes equipment maintenance.

Burroughs B 1900 Series

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	1-Year Lease*	5-Year Lease*
PUNCHED CARD EQUIPMENT					
B 9115	Card Reader; 300 cpm, 80-column; requires B 1115 Control	7,808	43.10	254	191
B 9116	Card Reader; 600 cpm, 80-column; requires B 1115 Control	9,845	60.40	323	244
B 9117	Card Reader; 800 cpm, 80-column; requires B 1115 Control	11,214	74.00	366	281
B 1115/-80	Card Reader Control for B 9115/6/7 Card Readers	2,292	12.50	59	47
B 9915	51-Col. Read Feature for B 9115/6/7 Card Readers	803	—	22	18
B 9991-2	Stand for B 9115/6/7	258	—	8	7
B 9119-1	Card Reader; 300 cpm, 96-column; requires B 1119 Control	4,553	36.10	139	113
B 9119-2	Card Reader; 100 cpm, 96-column; requires B 1119 Control	10,238	72.10	288	237
B 1119/-80	Card Reader Control; 96-column; for B 9119-1 or B 9119-2	2,472	11.00	96	79
B 9212	Card Punch; 150 cpm, 96-column; requires B 1213 Control	24,013	156.00	610	477
B 9213	Card Punch; 300 cpm, 96-column; requires B 1213 Control	29,605	200.00	748	584
B 1213/-80	Punch Control B 9212 or B 9213 Punch	4,584	20.70	122	101
B 9418-2	Card Reader Punch/Data Recorder; 80 columns, 200 cpm read, 45 cpm punch/print, requires B 1418 Control	12,422	131.00	402	330
B 1418-2	Reader/Punch Control for B 9418-2 Reader/Punch/Data Recorder	7,162	32.90	197	165
B 9419-2	Card Reader Punch/Data Recorder; 96 columns, 300 cpm read, 60 cpm punch and 60 cpm print; requires B 1419 Control	9,013	102.42	340	278
B 9419-6	Multi-Purpose Card Unit; 96 columns, 300 cpm read, 60 cpm punch, and 60 cpm print; requires B 1419 Control	9,528	122.08	407	335
B 1419/-80	Card Reader Punch/Data Recorder Control for B 9419-2 and B 9419-6	2,472	17.30	96	79
READER-SORTERS					
B 9135-2	Reader-Sorter; 900 dpm, 8 pockets	51,157	622.00	1,480	1,258
B 9135-3	Reader-Sorter; 900 dpm, 12 pockets	62,859	673.00	1,925	1,634
B 9134-1	Reader-Sorter; 1625 dpm, 4 pockets; requires B 9938-1 Multi-Track Read or B 9938-6 Optical Character Recognition System	47,104	506.00	1,259	1,020
B 9137-1	Reader-Sorter; 1625 dpm, 4 pockets, double read capability	40,170	675.00	1,339	1,174
B 1130/-80	Control for the B 9135 or B 9134-1	6,874	46.80	260	217
B 1130	Control for the B 9137-1	6,874	46.80	260	217
On-Line Features:					
B 9935-1	Expansion Feature; pockets 17-32	4,460	16.90	124	100
B 9935-2	Four-Pocket Module; pockets 5-16	13,379	59.00	369	299
B 9935-3	Four-Pocket Module; pockets 17-32	13,379	59.00	369	299
B 9936-1	Stacker Overflow	446	1.70	13	10
B 9937-1	Valid Character Check	222	1.70	7	6
B 9938-1	Multi-Track E13B	16,723	92.60	460	373
B 9938-6	Numeric OCR A (Size 1) Character Recognition System	47,380	198.00	1,227	995
B 9932-1	Endorser; 1625 dpm	8,362	84.10	245	199
B 9932-4	Batch Ticket Detector	446	1.70	13	10
B 9932-5	Short Document Read Feature	446	3.40	13	10
B 9932-6	Short Document Module Expander; requires B 9932-5	222	25.30	7	6
B 9930-3	Mobile Carrier	139	59.00	—	—
B 9930-4	One Tray Document Rack	56	—	—	—
B 9939-3	Resettable Item Counter	222	1.70	7	6
B 9939-4	Non-Resettable Item Counter	222	1.70	7	6
B 9939-5	Running Time Meter	222	1.70	7	6
Off-Line Features:					
B 9933-1	Basic Off-Line Sort; 2 fields standard	1,114	8.50	32	26
B 9933-2	8-Pocket Basic Off-Line Sort; 2 fields standard	1,338	8.50	37	31
B 9933-3	Expanded Off-Line Sort	222	1.70	7	6
B 9933-4	Extended Sort Control	2,230	25.30	62	50
B 9933-5	Zero Kill	446	1.70	13	10
B 9933-6	No Field, No Digit	446	1.70	13	10
B 9933-7	Digit Override	446	1.70	13	10
B 9933-8	Digit Edit	446	1.70	13	10
B 9933-9	Field Override	446	1.70	13	10
B 9933-10	Field Edit	446	1.70	13	10
TERMINALS					
TD 731	Self-Scan display/keyboard with control for async. data sets and direct-connect communications interface	2,715	26.41	120	116
TD 732	TD 731 unit with peripheral capability added	2,865	26.41	130	126
TD 733	Self-Scan display/keyboard with control for sync. data set communications	2,715	26.41	120	116
TD 734	TD 733 unit with peripheral capability added	2,865	26.41	130	126
TD 737	Self-Scan display/keyboard with control for sync. data set communications and IBM Bi-Sync. data communications procedures	2,715	26.41	120	116
TD 738	TD 737 unit with peripheral capability added	2,865	26.41	130	126

*Includes equipment maintenance.

Burroughs B 1900 Series

EQUIPMENT PRICES

TERMINALS (Continued)		Purchase Price	Monthly Maint.	1-Year Lease*	5-Year Lease*
TD 831	Self-Scan display/keyboard with control for async. data sets and direct-connect communications interface	2,796	22.91	124	49
TD 832	TD 831 unit with peripheral capability added	2,951	22.91	134	130
TD 833	Self-Scan display/keyboard with control for sync. data set communications	2,796	22.91	124	119
TD 834	TD 833 unit with peripheral capability added	2,951	22.91	134	130
TD 837	Self-Scan display/keyboard with control for sync. data set communications and IBM Bi-Sync. data communications procedures	2,796	22.91	124	119
TD 838	TD 837 unit with peripheral capability added	2,951	22.91	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	3.12	13	10
TD 017	Ten-key auxiliary keyboard (includes 2-foot separation cable)	180	1.59	7	6
TD 015-A	Alphanumeric typewriter keyboard	275	3.12	13	10
TD 019	Expanded alphanumeric keyboard	700	3.25	30	26
TD 019-1	Expanded alphanumeric keyboard with built-in magnetic card reader	900	9.75	39	34
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	8
Peripherals for the TD X32, TD X34, and TD X38:					
TD 078-1	Auxiliary magnetic card reader for the TD 015	1,260	8.17	42	26
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	19.08	108	90
TC 4001	Printing Terminal; 60 cps				
Intelligent Terminal with TC 4001 Printing Unit:					
TC 5110	With one cassette drive	13,700	71.83	433	339
TC 5113	With two cassette drives	16,790	94.33	535	407
DATA ENTRY SUBSYSTEMS					
AE 412	Audit Entry Data Preparation System	9,425	—	345	335
AE 422	Audit Entry Data Preparation System	7,365	—	272	264
AE 501	Audit Entry Data Preparation System	10,238	782.00	304	295
AE 511	Audit Entry Data Preparation System	10,558	—	427	415
AE 513	Audit Entry Data Preparation System	10,764	—	422	410
COMMUNICATIONS CONTROLS					
B 1351-1/-80	Single-Line Control; requires B 1650 Series adapter; one maximum	3,090	12.50	103	79
B 1351-1/-81	Dual-Line Control; requires B 1650 Series adapter; two maximum	5,150	22.70	160	138
B 1351-2	Universal Single-Line Control	3,000	21.00	110	98
B 1352	Multi-Line Controller; 8 lines; 2 maximum	9,270	43.80	252	217
B 1353	Multi-Line Controller Extension for B 1352 controller; 8 lines; 1 maximum	6,951	32.90	191	160
B 1354	4-Line Multi-Line Control	7,000	31.50	225	195
Data Communications Line Adapters; not for B 1351-2:					
B 1650-1/-81	Asynchronous Data Set Connect; up to 1200 bps	1,545	12.50	67	52
B 1650-2/-82	Asynchronous Data Set Connect; up to 1800 bps	1,854	15.70	82	67
B 1652-1/-81	Asynchronous Data Set Connect for teletypewriters	1,545	12.50	67	52
B 1650-5/-85	Asynchronous Direct Connect; up to 2400 bps	1,545	12.50	67	52
B 1850-6/-86	Asynchronous Direct Connect; up to 4800 bps	1,854	15.70	82	67
B 1650-7/-87	Asynchronous Direct Connect; up to 9600 bps	2,163	18.70	103	82
B 1652-5/-85	Asynchronous Direct Connect for teletypewriters	1,545	12.50	67	52
B 1667-2/-82	Burroughs Direct Interface (BDI) Adapter	2,472	12.60	77	52
B 1651-1/-81	Burroughs Synchronous Data Set Connect; up to 2400 bps	1,545	12.50	67	52
B 1651-2/-82	Burroughs Synchronous Data Set Connect; up to 4800 bps	1,854	15.70	82	67
B 1651-3/-83	Burroughs Synchronous Data Set Connect; up to 9600 bps	2,163	18.70	103	82
B 1653-1/-81	Binary Synchronous Data Set Connect; up to 2400 bps	4,532	49.90	175	149
B 1653-2/-82	Binary Synchronous Data Set Connect; up to 4800 bps	5,099	53.00	191	160
B 1653-3/-83	Binary Synchronous Data Set Connect; up to 9600 bps	5,665	56.20	201	170
B 1352-2/-82	Wide-Band Adapter; for Western Electric Type 303 or equivalent data set, 19,200 bps or 50,000 bps	11,845	54.60	324	268
B 1667-5/-85	Automatic Calling Unit Adapter; connects with up to four Bell 801 Automatic Calling Units or three Bell 801s and one Burroughs built-in data set automatic calling unit	1,545	12.50	67	52
COMMUNICATIONS CONTROLS FOR CMS SYSTEMS					
B 1360	DCP-1 Base Module; accepts up to three DCI Adapters	15,000	45.00	483	416
B 1365	DCP-1 Extension; accepts up to four DCI Adapters	4,000	33.00	130	112
B 1660	DCI Adapter	2,800	19.00	133	108

*Includes equipment maintenance.

Burroughs B 1900 Series

SOFTWARE PRICES

	UNLIMITED TIME PLAN		LIMITED TIME PLAN	
	Initial Charge (Single Payment)	Initial Charge (12 Monthly Payments)	Annual License Fee	Monthly License Fee
SYSTEM SOFTWARE				
MCP-TCS III; for the B 1905; includes MCP II, NDL, ODESY, either Text Editor or CANDE, choice of one compiler, Sort, and Utilities	\$ 7,500	—	\$1,200	\$ 250
MCP-TCS IV; for the B 1955 or B 1985; includes MCP II, NDL, ODESY, GEMCOS and UPL, either Text Editor or CANDE, choice of one compiler, Sort, Utilities, and either DMS-II and DMS-II Inquiry or Reporter II Basic and On-Line Reporter	18,000	—	2,880	600
CM-TCS; for B 1955 operating in CMS mode; includes MCP, NDL, ODESY, CANDE, either CMS COBOL or CMS RPG compiler, and utilities	7,500	—	1,200	250
BASIC	3,000	—	480	100
Interactive BASIC	2,250	—	360	75
COBOL '68	3,000	—	480	100
COBOL '74	3,000	—	480	100
FORTRAN '77	3,600	—	576	120
RPG	3,000	—	480	100
MIL Compiler (Micro Implementation Language)**	3,090	\$ 283	494	—
SDL Compiler (Systems Definition Language)**	3,090	283	494	—
User Programming Language (UPL)	—	—	—	206
Network Definition Language (NDL)	—	—	—	52
Burroughs Network Services	6,000	550	960	200
GEMCOS	4,590	421	734	153
GEMCOS and UPL	6,120	561	979	204
GEMCOS (Advanced)	6,120	561	979	204
GEMCOS (Advanced) and UPL	7,650	702	1,224	255
GEMCOS Total	7,650	702	1,224	255
GEMCOS Total with UPL	9,180	842	1,469	306
Audit Reporter	15,080	1,382	2,413	503
Advanced Reporter II	11,030	1,011	1,765	368
Reporter II (Basic)	7,000	642	1,120	234
On-Line Reporter	1,030	95	180	34
Audit Entry Host Utilities	750	69	83	25
Supervisory Message Control System (SMCS)	1,545	142	247	52
System Communication (SYCOM)	3,030	283	485	103
Disk FORTE/2	12,775	1,171	2,044	426
Test Data Generator	7,000	642	1,120	234
ODESY	4,675	430	748	157
Data Management System II	13,925	1,277	2,228	465
DMS II Inquiry	1,500	138	240	50
Text Editor	1,815	167	290	61
CANDE	3,525	323	564	117
TABS	1,290	118	206	43
On-Line Transaction Management Package	19,007	—	3,041	—
PROGRAM PRODUCT CONVERSION AIDS				
Honeywell COBOL Translator	3,700	340	572	103
NCR Neat/3 Level 1 Translator	8,500	779	1,360	283
RPG to Burroughs COBOL Translator (COFIRS)	7,415	680	1,186	247
IBM 1400 Interpreter	—	—	—	206
B 100/200/300/500 Interpreter	—	—	—	206
IBM 1130 Interpreter	—	—	—	206
TERMINAL PROGRAMS				
Power RJE	1,300	119	208	43
HASP RJE	1,300	119	180	43
B 7000/B 6000 Remote Job Entry Terminal Program	1,235	113	155	41
B 4000/B 3000/B 2000 Remote Job Entry Terminal Program	1,235	113	155	41

**Available only to universities and colleges under a special Program Products License.

Burroughs B 1900 Series

SOFTWARE PRICES

	UNLIMITED TIME PLAN			LIMITED TIME PLAN
	Initial Charge (Single Payment)	Initial Charge (12 Monthly Payments)	Annual License Fee	Monthly License Fee
APPLICATION PROGRAM PRODUCTS				
Management Decision Aids				
Infostats—Forecasting	7,725	709	850	276
Infostats—Statistics	5,665	519	623	202
PROMIS/TIME	5,575	511	613	199
TEMPO/BASIC	6,675	612	734	238
TEMPO/NETWORK	4,470	410	492	160
TEMPO/MODELER	6,675	612	734	238
Business Management System (all modules)	8,045	737	885	287
Invoicing, Accounts Receivable, and Inventory Control	3,585	329	394	128
Accounts Payable	1,690	156	186	60
Payroll	2,100	193	231	75
General Ledger	1,690	156	186	60
Incentive Payroll System	1,165	107	128	42
Production Control System II				
Engineering Data Control Module	5,015	460	552	179
Inventory Control Module	5,015	460	552	179
Requirements Planning Module	5,015	460	552	179
Work in Process Module	6,675	612	734	238
On-Line Inquiry Module	4,030	370	443	144
On-Line File Maintenance Module	6,015	552	662	215
Capacity Requirements Planning Module	3,090	283	340	110
Forecasting and Inventory Analysis Module	6,015	552	662	215
Operation Scheduling and Loading Module	6,675	612	734	238
Master Production Scheduling Module	5,015	460	552	179
Production Control System III				
Engineering Data Control Module	5,950	545	655	213
Inventory Control Module	5,950	545	655	213
Master Production Scheduling Module	5,950	545	655	213
Material Requirements Planning Module	5,950	545	655	213
Work in Process Module	5,950	545	655	213
Operation Scheduling and Loading Module	7,125	653	784	254
Capacity Requirements Planning Module	3,300	303	363	118
Forecasting and Inventory Analysis Module	6,425	589	707	229
On-Line Inquiry Module	4,300	394	473	154
On-Line File Maintenance Module	6,425	589	707	229
Motor Freight Business Management System				
Motor Freight BMS	13,360	1,225	1,470	477
General Ledger and Reporting System	4,025	369	443	144
Vehicle Maintenance and Asset Control	4,025	369	443	144
Accounts Receivable and Freight Billing	3,150	289	347	113
Payroll	1,890	174	208	68
Accounts Payable	1,890	174	208	68
Owner Operator	2,260	207	249	81
Distribution				
Order Processing	15,450	1,416	1,700	552
Inventory Accounting	5,150	472	567	184
Accounts Receivable	5,150	472	567	184
Data Base Manager	3,090	284	340	110
Transaction Manager	1,545	142	170	55
On-Line Wholesale Distribution System	11,085	1,017	1,219	392
Inventory Planning Analysis and Simulation System (BIPASS)				
Analysis and Simulation Module	7,560	693	832	270
Operation Control Module	5,790	531	637	207
On-Line Inquiry and Data Entry Module	2,840	261	312	101
Bank Management System				
DDA, Savings, Installment Loans, Certificates of Deposit, Proof and Transit, and General Ledger	7,920	726	—	283
DDA (Demand Deposit Accounting)	2,845	261	—	102
Proof and Transit	1,270	116	—	45
Savings	1,790	165	—	64
Installment Loan	1,270	116	—	45
Certificates of Deposit	1,000	92	—	36
General Ledger	740	68	—	26

Burroughs B 1900 Series

SOFTWARE PRICES

APPLICATION PROGRAM PRODUCTS (Continued)	UNLIMITED TIME PLAN			LIMITED TIME PLAN
	Initial Charge (Single Payment)	Initial Charge (12 Monthly Payments)	Annual License Fee	Monthly License Fee
Commercial Loan Accounting	2,260	207	—	81
Bank Customer Information System				
Reporting Module	900	82	—	32
Inquiry	900	82	—	36
Update	900	82	—	32
Item Processing System				
Item Processing	9,980	916	—	356
Document Processing System	2,350	216	259	84
Remote Document Processing	1,230	113	150	44
Foreign Exchange and Money Market Accounting System	38,670	3,545	4,253	1,381
Proof Management System	16,480	1,511	1,813	589
Thrift System				
Thrift Batch System	38,670	—	4,253	—
Thrift On-Line System	44,175	—	4,859	—
Hospital Management System (BHAS II)				
On-Line Data Entry/Inquiry	5,665	519	623	202
Patient Accounting	4,915	451	541	176
Medical Records	2,525	232	278	90
General Ledger	2,525	232	278	90
Payroll	2,525	232	278	90
Accounts Payable	2,525	232	278	90
Professional Standards Review Organization	2,525	232	278	90
Hospital Information Processing System (BHIPS)				
Data Communications Handler	4,030	370	443	144
On-Line Admissions	5,615	515	618	201
On-Line Pharmacy	5,615	515	618	201
On-Line Laboratory	5,615	515	618	201
On-Line Order Entry	5,615	515	618	201
Utility Management System				
Utility Business Management System	7,775	714	855	278
Utility Billing System	3,370	309	371	120
Government Management Systems				
Budgetary Management System	3,370	309	—	120
Local Government Management System	5,355	491	—	191
Local Government and Utility Management	8,665	794	—	309
Budgetary Purchase Order Module	1,270	116	—	45
SCHOLASTIC Education Programs				
School Scheduling System	5,570	511	613	199
Scheduler On-Line Data Entry	2,369	217	261	85
Financial	4,030	370	443	144
Financial On-Line Data Entry	2,369	217	261	85
Student Records	3,050	280	336	109
Student Records On-Line Data Entry	2,369	217	261	85
Student Records Inquiry System	2,370	217	261	85
Payroll	3,625	333	399	129
Instructional Materials	3,050	280	336	109
Test Scorer	3,810	350	—	136