

Burroughs B 3965

MANAGEMENT SUMMARY

UPDATE: *The V Series, Burroughs new medium-scale processor line, has replaced the B 2900 and B 3900 systems. The only surviving member of this venerable family is the B 3965, which replaced the B 3955. The B 3965 is equivalent in performance to the B 3955 but has a lower price tag. Burroughs is no longer marketing the B 2900 as a stand alone system, but continues the support.*

The B 3965 is designed to support a large number of terminals for on-line or batch processing in banking, manufacturing, and the health field. The character-oriented central processor utilizes decimal arithmetic, well suited for business programming languages such as Cobol and RPG.

The B 3965 system features asynchronous pipelined architecture, which Burroughs calls "micromodular concurrent" architecture. Each central processor is composed of a series of processing elements that can operate concurrently to perform such operations as instruction prefetch and data address calculation, data fetching and manipulation, instruction execution, and independent I/O initiation and transfer. According to Burroughs, the B 3965 provides a 50 percent performance improvement over the B 2925.

The Input/Output Processor (IOP) initiates data transfers between the memory and peripheral subsystems asynchronously and independently of the central processor. The IOP is interfaced to the peripheral subsystems through Data Link Processors (DLPs). Each DLP is an independent microprocessor programmed to service a specific category of peripheral devices.

The basic B 3965 system includes two megabytes of main memory, an operator keyboard/display terminal, two DLP bases, six DLPs, and two 5¼-inch minidisk drives. The system is expandable to five megabytes of main memory and 32 DLPs. Various front-end data communications processors are available to further enhance the capabilities of the system.

In addition to the uniprocessor configurations specified, the B 3965 system can be expanded with up to three additional processors to form a loosely coupled multiprocessor system with shared mass storage, peripherals, and communications systems. With the addition of the Shared System Processor (SSP), the operating system, compilers, utilities, program libraries, and data files can also be shared by up to four central processors. The SSP forms part of the I/O subsystem and is physically a DLP with memory cards. Multiprocessor systems can include the previous B 2900 and B 3900 Series systems. The SSP requires a dedicated DLP Base in the host or the expansion cabinet of the B 3965.

The B 3965 features the Master Control Program MCP IX operating system. MCP IX is functionally compatible with ➤

The B 3965 is a medium-scale computer system that features asynchronous pipelined architecture, multiprocessing capabilities, and Data Link Processors that manage I/O operations independently of the central processor.

CONFIGURATION: The B 3965 has from 1 to 4 processors, 2 to 5 megabytes of main memory, and 7 to 32 Data Link Processors.

MODELS: B 3965.

COMPETITION: Honeywell DPS 7, IBM 4300 Series, IPL Systems 4400 Series, NCR V8500, and Sperry System 1100/60.

PRICE: Purchase price for the basic B 3965 system is \$120,000.

CHARACTERISTICS

MANUFACTURER: Burroughs Corporation, Burroughs Place, Detroit, Michigan 48232. Telephone (313) 972-7000. Canada: Burroughs Canada, 801 York Mills Road, Don Mills, Ontario M3B 1X8. Telephone (416) 445-4030.

MODEL: Burroughs B 3965.

DATA FORMAT

BASIC UNIT: Memory word size is eight digits (32 bits).

FIXED-POINT OPERANDS: Information not provided by vendor.

FLOATING-POINT OPERANDS: Information not provided by vendor.

INSTRUCTIONS: Information not provided by vendor.

INTERNAL CODE: 8-bit EBCDIC is standard. Information coded in ASCII can also be processed. ASCII is the primary data communications code.

MAIN MEMORY

The memory subsystem consists of the memory storage cards, the error detection/correction logic, and the memory interface control. The memory performs in four cycles, a write cycle, a read cycle, a modified write cycle, and a refresh cycle. Memory is refreshed approximately every two milliseconds and the refresh cycle is transparent to processor operation. The memory refresh and the error correction circuitry are contained in the memory interface control.

STORAGE TYPE: MOS; 64K-bit RAM memory chips.

CAPACITY: 2 to 5 megabytes.

CYCLE TIME: Information not provided by vendor.

CHECKING: All single-bit errors are detected and corrected. All double-bit errors are detected.

RESERVED STORAGE: Not available on this system. ➤

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▶ the previous release, MCP VI, and supports the same features. MCP IX has been optimized to take advantage of the B 3965 system technology and to increase total system throughput.

COMPETITIVE POSITION

The Burroughs medium-range processor lineup is undergoing a transitional period as the vendor phases out the generation using 64K-bit memory chips and replaces it with 256K-bit machines, fast becoming the new industry standard. The older 64K-bit systems from Honeywell, IBM, NCR, and Sperry are competing with the Burroughs B 3965 in the medium-level, general-purpose computer market. Stiff competition comes from IBM's entry-level 4361 processors. The bottom-of-the-line single-processor IBM 4361 Model Group 3, introduced towards the end of 1984, features between two and four megabytes of main memory and sells for \$56,500. The IBM 4361 Model Group 4 features between 2 and 12 megabytes of main memory and sells for \$135,000. The B 3965 system has 2 to 5 megabytes of memory and is priced at \$120,000. Direct performance comparisons between Burroughs processors and competing machines are difficult to make since Burroughs does not release processor cycle time or MIPS (millions of instructions per second) ratings.

The 256K-bit single-processor V Series that was delivered in the fourth quarter of 1985 is replacing the B 2900 and the B 3900. The V 310 has a main memory capacity of 5 to 10 megabytes and prices ranging from \$160,000 to \$210,000. The V 340 features a minimum of 10 megabytes of memory and lists for \$390,400. The V 380 also comes with a minimum of 10 megabytes of memory and sells for \$702,600.

ADVANTAGES AND RESTRICTIONS

Over the years, Burroughs has strived to maintain object code compatibility for customers upgrading to newer Burroughs systems. The transition from the B 3965 to the new V Series should be no exception to this long-standing policy. Application software developed for the B 3900 systems can execute without modification on the V Series. All peripherals can be transferred from the older B Systems to the new V Series, reducing conversion costs. But the B 3965 cannot be field upgraded to the V 310. The V 310, which was introduced in March 1986, is equivalent in performance to the B 3965 but has a larger main memory capacity, a faster input/output bandpass, and is field upgradable to the V 340.

A major B 3965 advantage designed to enhance system throughput is the use of pipelining, which allows the processors to perform concurrently many of the functions that other central processors must perform serially. Pipelining techniques allow the following processing steps to be overlapped: instruction prefetch, program and data address calculations; data fetch and manipulation; instruction execution; and independent input/output initiation and transfer. This technique, according to the vendor, provides for significantly increased processing power.

▶ CENTRAL PROCESSOR

The B 3965 processor employs an asynchronous pipelined architecture utilizing multiple, independent processor modules. This design allows processing steps to be overlapped, including instruction prefetch, address calculations, and data address calculations; data fetch and manipulation; instruction execution; and I/O initiation. The concurrent processing is a function of the microcode resident within each module.

The B 3965 central system consists of the Memory Interface Control (MIC) module, the Parallel/Serial Interface (PSI) module, the Fetch module, the Math module, the Address Store and Manipulate (ASAM) module, the Master Control Store (MCS) module, the Clock/Timer module, and the I/O Processor (IOP).

The *MIC* module provides an interface to the memory storage cards. It performs BCD-to-binary conversion on memory addresses and contains the error correction and memory refresh control circuitry.

The *PSI* module provides a data path between main memory and the CPU, and requests all memory cycles needed by the processor. The *PSI* module also performs data zone stripping or adding as specified by the various move instructions.

The *Fetch* module performs all of the functions necessary to resolve the instruction *OP* (Operation) codes, variants, and addresses in preparation for execution. This resolution includes modifying the base address when the program base is not equal to zero, performing all address indexing, and resolving all indirect addressing. The *Fetch* module controls the other modules needed to fetch an instruction.

The *Math* module is the arithmetic unit of the central processor. It performs all data manipulation specified by an instruction during instruction execution. The *Math* module contains data buffers capable of storing 256 bytes of data for each operand address. The data storage capability is designed to enhance processor-to-memory interfacing during instruction execution.

The *ASAM* module stores the memory addresses of operands used by the processor during the execute phase of an instruction. It also performs base and limit boundary checking for the processor during both the fetch and execute phases of an instruction.

The *MCS* module receives an instruction from the *Fetch* module after all variables are resolved. It sequences all events needed to complete an instruction and controls all other modules involved in the execution of an instruction.

The *Clock/Timer* module produces the 7-megahertz main system clock used by the central processor and also generates a 7-megahertz clock for use by the *MIC*. The *MIC* clock is 180 degrees out of phase with the system clock. The *Clock/Timer* module also provides a realtime clock function.

The *IOP*, independently of the central processor, initiates data transfers between main memory and peripheral subsystems. The *IOP* uses I/O descriptors to manage the entire I/O operation. The *IOP* is interfaced to the peripheral subsystems through Data Link Processors (DLPs). Each *DLP* is microprocessor-controlled and is independent of every other *DLP*.

The B 3965 can be configured with up to four central processors. The multiprocessor configuration shares the CP 3680 Data Communications System, mass storage, magnetic tape units, printers, punched card equipment, and MICR/OCR reader/sorters. Multiprocessor configurations are also sup-

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TABLE 1. SYSTEM CHARACTERISTICS

MODEL	B 3965
SYSTEM CHARACTERISTICS	
Date announced	First quarter 1986
Date first delivered	Second quarter 1986
Field upgradable to	—
Relative performance	—
Number of processors	1 to 4
Cycle time, nanoseconds	571
Word size, bits	32
Operating systems	MCP IX
MAIN MEMORY	
Type	64K-bit MOS
Minimum capacity, bytes	2MB
Maximum capacity, bytes	5MB
Increment size	1MB or 3MB
Cycle time, nanoseconds	—
BUFFER STORAGE	
Minimum capacity	Not applicable
Maximum capacity	—
Increment size, bytes	—
INPUT/OUTPUT CONTROL	
Number of channels:	
Byte multiplexer	—
Block multiplexer	—
Word	—
Other	7 to 32 DLPs

▷ USER REACTION

User ratings specifically for the B 3965 are not available, because Burroughs did not commence shipment of this system until the second quarter of 1986. The results of the 1986 Datapro Computer User Survey listed in the following table are for the B 3955, which is identical to the B 3965. As usual, users were very satisfied with the vendors hardware and operating system; also Burroughs' efforts in the maintenance service area are reflected in the high ratings in this year's survey. Documentation and application software are still sore spots that need improvement.

Twenty-three B 3955 users responded to our survey. Eight users worked in city or state government, and seven worked in banks and financial institutions. The other eight respondents worked in retail/wholesale, transportation, and manufacturing. The principal applications of the system were in accounting/billing, payroll/personnel, and banking, check processing, loans, and savings. Twenty users purchased their systems from the vendor, and 15 of the 23 respondents converted from smaller Burroughs systems. The Database Management System, DMS II, was used by eleven B 3955 users and was given a rating from good to excellent. Twelve users had a disaster recovery plan in place and four users had recovery plans in the planning stage. When asked about future acquisition plans, most users listed additional software from the vendor or other suppliers, and expansions to present hardware and data communications facilities as priorities for 1986.

As part of the survey, B 3955 users were asked to rate their equipment in 14 specific areas. A weighted average was then calculated based on the total number of responses. ▷

▶ ported by the B X376-95 Shared System Processor (SSP). The SSP enables the capabilities of the operating system, compilers, utilities, program libraries, and data files to be shared by up to four processors. The SSP provides the capability for both read and write access of the same file by different programs executing in one to four central systems. The SSP prevents the erroneous updating of data that may be concurrently accessed from multiple processors.

SPECIAL FEATURES: The B 3965 includes a System Maintenance Vehicle (SMV). The major component of this maintenance system is the Integrated Universal Console (IUC), an independent microcomputer which interfaces the field engineer or system operator with the central system hardware. The IUC controls both system testing and system initializing. The maintenance system has the capability of identifying system malfunctions by initializing the hardware to a known state, issuing a number of clocks, and examining the machine states to determine if any values are incorrect. This diagnostic capability extends to all parts of the system, including the central processor and memory control.

PHYSICAL SPECIFICATIONS: The B 3965 central system cabinet is 73 inches (185 cm) high, 76.5 inches (194 cm) long, 32 inches (81 cm) wide, and weighs 1,400 pounds (636 kg).

CONFIGURATION RULES

The basic B 3965 includes two megabytes of main memory expandable to five megabytes in one- or three-megabyte increments. Two DLP Bases and a console DLP, an operator display DLP, two disk drive DLPs, a line printer DLP, and a card reader DLP are standard. A B 3965 can support a maximum of 4 DLP Bases and 32 DLPs. The third and fourth DLP Bases require an extension cabinet.

INPUT/OUTPUT CONTROL

The B 3965 includes one or two input/output processors (IOPs) that control the movement of data between main memory and the system input/output devices. All individual peripheral devices operate under control of Data Link Processors (DLPs), which are associated with each input/output channel. Each DLP is designed to control a particular type of peripheral device and contains one or more record-length buffers to minimize contention for accesses to main memory.

The Data Link Processors are housed in the DLP Base, which contains 34 card positions and a power supply sufficient to handle 8 DLPs. Although the maximum number of DLPs per base is always eight, the exact number that can be housed in one base is determined by the number of cards required by the individual DLPs, as signified by each DLP's numeric suffix. A total of 20 cards per base are available for the DLPs. The DLPs provide high-speed data transfer through record-length buffers of 80 bytes for punched card equipment, 132 bytes for printers, and five 256-byte buffers for disk pack drives. The aggregate data rate through the input/output processor is 7 megabytes per second.

MASS STORAGE

For disk subsystems supported on the B 3965, refer to Table 2.

INPUT/OUTPUT UNITS

For information on magnetic tape units and printers used with the B 3965, refer to Table 3.

TERMINALS

Refer to Table 4 for terminals used with the B 3965. ▶

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	Excellent	Good	Fair	Poor	WA*
Ease of operation	18	5	0	0	3.78
Reliability of mainframe	13	9	1	0	3.52
Reliability of peripherals	6	10	7	0	2.96
Maintenance service:					
Responsiveness	14	8	1	0	3.57
Effectiveness	9	12	2	1	3.30
Technical support:					
Troubleshooting	4	15	4	0	3.00
Education	4	13	6	0	2.91
Documentation	2	12	9	0	2.70
Manufacturers software:					
Operating system	19	4	0	0	3.83
Compilers & assemblers	11	13	1	0	3.43
Applications programs	6	8	6	0	2.74
Ease of programming	15	7	0	0	3.09
Ease of conversion	14	7	1	0	3.43
Overall satisfaction	13	8	1	0	3.39

Weighted Average on a scale of 4.0 for Excellent.

When B 3965 users were asked whether their systems performed as expected, 22 said "Yes," and one was "Undecided." When asked whether they would recommend their systems to others, 21 said "Yes," and two were "Undecided." □

► COMMUNICATIONS

A range of data communications options are available for the B 3965 to meet a variety of network requirements.

The *B 974 Systems and Communications Processor (SCP)* features a multiple-processor architecture, providing up to seven integrated, 3-megahertz processors with a total memory capacity of 1.8 megabytes, using 64K-bit chip technology. The processors are assigned to specific system functions, such as the operating system, data communications, file management, and Inter System Control. The B 974 can contain up to three data communications processors and support up to 30 data communications lines, expandable up to 96 lines using the CP 9530 Line Expansion Module (LEM). In the asynchronous mode the maximum transmission speed is 1800 bits per second, and in the synchronous or bisynchronous mode the maximum transmission speed is 9600 bits per second.

The *B 874-4 Systems and Communications Processor (SCP)* is a microprogrammed, front-end communications processor that performs the specialized functions associated with the transmission and reception of data, including error recovery, code translation, line discipline management, and most network control functions. The B 874-4 contains a 4-megahertz processor with 16K bytes of control memory. Also available is a 16K-byte user memory module, expandable to 96K bytes. The B 874-4 is fully object code compatible with the B 974.

Line adapters available for the B 874 SCP include standard asynchronous/synchronous/binary synchronous, standard two-wire direct connect, automatic dial-out, and Burroughs Data Link Control (BDLC). The B 874 Adapter Cluster will accommodate up to 16 line adapters. Most of the line interface adapters are dual adapters, handling two full-duplex lines, each with different characteristics. The adapter cluster allows data speeds up to 19,200 bits per second per line adapter in an environment of up to 32 half-duplex communications lines or 16 BDLC half-/full-duplex lines. A TTY-compatible line adapter provides data transmission at up to 38,500 bits per second.

The *B X351-90 Uniline DLP* provides connection for data sets (with or without automatic dial-out), while the *B X351-91* provides Burroughs direct interface and two-wire direct connect facilities. The B X351-90 Uniline DLP permits connection between a single processor and one communications line through a data set employing either the Burroughs standard asynchronous or synchronous line procedures. In the synchronous mode the maximum transmission speed is 9600 bits per second, and in the asynchronous mode the maximum transmission speed is 1800 bits per second.

The *CP 3682 Communications Processor* is a front-end communications system that can simultaneously service up to four Burroughs B 3965 host computers. Two models are available: the basic CP 3682 Data Communications System and the CP 3682-01 Redundant Communications System. The CP 3682-01, operating in a "hot standby" mode, assumes control of the network and host interfaces in the event of a CP 3682 failure.

CP 3682 capabilities include on-line network generation and management; control of all line protocol functions such as polling and selecting stations; support for polled, bisynchronous, Teletype, point-to-point, and bit-oriented protocols; user-defined protocols; control character mapping for device-independent application programs; on-line network statistics and monitoring; and queuing of inbound and outbound messages. Optional features include the Remote Diagnostic Facility and the Power Fail Recovery Option, which provides battery backup in the event of an external power failure.

The CP 3682 supports a number of commonly used communications protocols, which Burroughs has grouped into five Protocol Classes. Class 1 protocols include polled protocols such as Burroughs Poll-Select, Lear-Siegler ADM2, NCR 270 variants, NCR 796 variants, and IBM 2260. Class 2 protocols are binary synchronous protocols such as point-to-point (IBM 2780/3780), multipoint (IBM 3270), multipoint inverse (to communicate with IBM hosts), and NCR bisync transparent (3270 variant). Class 3 protocols include Teletype, TWX, and Bell Vu-Set protocols. Class 4 protocols include point-to-point protocols, such as Burroughs Remote Job Entry (B 761) and Burroughs point-to-point batch mode variant, contention mode variant, and conversational variant. Class 5 protocols include Burroughs Data Link Control (BDLC), ISO High-Level Data Link Control (HDLC), ANSI Advanced Data Communications Control Procedures (ADCCP), and IBM Synchronous Data Link Control (SDLC).

The basic CP 3682 system includes a processor with 512K bytes of memory; a 20-megabyte disk subsystem with interface; a realtime clock; a Dual Channel Port Controller (DCPC); a diagnostic adapter; a diagnostic modem; a system console interface; and a firmware set. A CP 3641-01 system console is required for the first CP 3682 system at each site.

Two types of microprocessor-based communications adapters are available: an eight-line asynchronous adapter and a two-line asynchronous/synchronous adapter. Each adapter requires one I/O port and supports an aggregate data rate of up to 8,000 characters per second. With the eight-line asynchronous adapter, all communications lines must operate at the same data rate and the protocols used must be of the same protocol class. When the two-line synchronous adapter is used, all communications lines must use protocols of the same protocol class, but data rates can vary.

The CP 3682 system can be expanded to 25 I/O ports by the addition of the I/O Expansion Unit. Further expansion, to a maximum of 41 I/O ports, is accomplished by adding the

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► I/O Port Extender. Of the total of 41 I/O ports, 36 can be used for communications interfaces. The number of line adapters cannot exceed 8 on an entry-level CP 3682, 22 on a CP 3682 with the I/O Expansion Unit, or 36 on a CP 3682 with the I/O Expansion Unit and the I/O Port Extender. A maximum CP 3682 configuration supports up to 288 asynchronous multidrop lines or 72 synchronous multidrop lines, up to 1,500 terminal stations, and up to 2,000 transaction types. However, when the number of terminals in the network exceeds 400, a 256K-byte memory module must be added. The CP 3682 transfers data to the host computer at a rate of 40,000 characters per second.

The CP 9582 Communications Processor is used to interlink remote data processing operations and local network terminals with each other and with central computers to form data communications networks of various sizes. The CP 9582 includes four to eight 3-megahertz processors and a maximum main memory of 3.4 megabytes. Up to 39 data communications lines can be installed in the CP 9500 cabinet; a maximum of 128 lines can be supported utilizing the CP 9530 Line Expansion Modules.

The RS-232-C interface supports asynchronous transmission at up to 1800 bits per second and synchronous transmission at up to 9600 bits per second. The Burroughs Direct Interface (BDI) supports asynchronous data transmission at up to 19,200 bits per second. The Terminal Direct Interface (TDI) supports direct connections at a rate of up to 9600 bits per second for devices located within 1,000 feet, and 38,400 bits per second for devices located within 250 feet of the host processor.

SOFTWARE

OPERATING SYSTEM: The *Master Control Program IX (MCP IX)* is a modular operating system that schedules and controls all operations of the systems. The MCP IX requires from 14K to 50K bytes of main memory, up to 400K bytes of disk storage, at least one magnetic tape unit, a card reader, and a console typewriter or display console. A high-speed trace option adds another 7.5K bytes to the main memory requirements.

The MCP IX multiprogramming executive can supervise the execution of up to 99 concurrent jobs. Under MCP, user programs can be divided into a resident portion that must be resident in main memory for program execution and a series of segments that can overlaid and brought into main memory only when required for program execution. The compiler builds a segment dictionary reflecting the program organization, and computes the memory requirements for containing the resident portions of the program plus the minimum main memory space required for accommodating the largest single overlaid segments of the program. During program execution, the MCP IX uses the segment dictionary to locate required program segments either in main memory or on disk. When adequate main memory space is available, the MCP's overlay segments are allowed to remain in main memory until the space is required by another program. MCP IX also provides a virtual memory management capability that allows the use of programs that exceed the size of the physical main memory.

The MCP IX performs the following principal functions: 1) schedules the loading and execution of user programs in a multiprogramming environment; 2) allocates main memory storage and relocates user programs as necessary to achieve efficient storage utilization; 3) schedules and initiates all I/O operations; 4) services all interrupts and attempts recovery from I/O errors; 5) provides I/O control functions such as blocking, buffering, file opening and closing, data communications control, etc.; 6) loads program segments or overlays upon request; 7) creates and maintains disk program libraries in symbolic and/or machine-language form;

8) establishes communication between the system and its operator via the console typewriter, display console, and control cards; 9) provides dump, trace, and checkpoint/restart facilities; and 10) maintains a system log.

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

Other significant MCP IX features are 1) a capability that permits asynchronous transfers of data between programs; 2) a 3-level priority system that permits assignment of separate priorities for scheduling, processing, and memory utilization; 3) a 3-level logging system that provides an Operator Display Terminal Log of all system messages, a Maintenance Log showing the performance of each system component, and a Run Log that facilitates cost distribution and system audits; 4) an ability to relocate the MCP modules in main memory; and 5) ability to overlap MCP I/O operations (such as opening files) with computing.

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

Work Flow Language (WFL) is an MCP IX facility and a free-form, English-like language for managing the flow of job streams, priorities, and resource allocation in a Burroughs multiprogramming environment. WFL can implement work flow control functions including task initiation, task termination, task attributes, file attributes, file equation, control statements, declarations, and printout control. WFL provides job streaming capabilities by specifying the execution sequence of interrelated programs as serial or parallel.

PROGRAMMING LANGUAGES: Languages supported on the B 3965 are Burroughs Program Language (BPL), Basic, Cobol 74, Fortran 77, and RPG II.

DATA BASE MANAGEMENT: *Data Management System II (DMS II)* is a comprehensive data base management system integrated with the MCP IX operating system which uses MCP facilities for accessing records in the data base to achieve greater run-time efficiency. Through the MCP IX facilities, the DMS II data base can be accessed by applications programs operating in multiple processing environments, such as batch, remote job entry, time-sharing, and transaction processing. DMS II incorporates a Data and Structure Definition Language (DASDL) that provides for the logical description of data in sets or subsets and for mapping the logical data into physical structures. A variety of retrieval methods is supported, including indexed sequential, random, and ordered lists. The latter method creates indices that require small amounts of disk storage and permits very fast searches.

DMS II permits multiple indices to be established for accessing a file, and each file can be accessed by any of the available access methods to provide retrieval of information ►

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TABLE 2. MASS STORAGE

MODEL	B 9484-12	B 9494-41	B 9494-5
Cabinets per subsystem	2 to 16	1	2 to 16
Disk packs/HDAs per cabinet	1 removable	2 fixed	1 removable
Capacity	252MB	400MB	542MB
Tracks/segments per drive unit	—	—	—
Average seek time, msec.	28.5	19.8	21.7
Average access time, msec.	36.8	28	30
Average rotational delay, msec.	8.3	8.17	8.3
Data transfer rate	1,200,000	650,000	1,200,000
Controller model	B 9387-51 B 9387-52	B 9387-51 B 9387-52	B 9387-51 B 9387-52
Comments	Requires B X304-90 DLP	Requires B X304-90 DLP	Requires B X304-90 DLP

► by different applications programs. Cobol and RPG II interfaces are provided. When multiple programs are accessing the data base, DMS II provides lockout protection at the record level to prevent simultaneous updating of a record. The DMS II audit trail captures a record of all data base maintenance functions to facilitate automatic recovery.

DMS Inquiry is an optional extension of DMS II and provides an easy-to-use language that enables non-EDP personnel to access the data base via remote terminals. Users can "browse" through information stored in the data base and retrieve it either serially or randomly, without the delays normally associated with programming and debugging an inquiry program.

DATA MANAGEMENT: Included in DMS II described above.

DATA COMMUNICATIONS: The special-purpose programming tool *Network Definition Language (NDL)* 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 applications programs to deal with remote terminals in the same manner as with conventional on-site peripheral devices. After the programmer defines the 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 for Systems and Communications Processors. The NDL compiler requires a minimum of 90K bytes of main memory.

The software system *Generalized Message Control System (Gemcos)* generates an installation-defined Message Control System (MCS) that manages a transaction-oriented communications network, provides security, handles transaction routing, controls message formatting, and provides a transaction processing interface for applications programs. All transaction terminals in the network are controlled by the Gemcos-created MCS and interfaced to the applications programs and the data base. Thus, Gemcos enables users to develop transaction processing applications programs independently of the network environment. The input to Gemcos is coded in the Transaction Control Language, a descriptive, free-form language that uses keywords to describe both the network environment and the requirements for message routing, message formats, access control, recovery, etc. Alternatively, a user-developed Message Control System can be written in Cobol or the Burroughs Program Language (BPL).

The time-sharing message control system *Command and Edit Program (Cande)* enables multiple users at remote terminals to create programs or data files, compile and execute programs, edit and alter programs or files, search files, send messages to other terminals, and perform a

variety of other functions. Files created through Cande can be saved and used later by the same user or by other users to whom access is granted. Cande provides the capability for interactive program development and testing concurrently with the execution of applications programs. It also provides effective control of the access, security, and charging functions in a computer time-sharing network.

Remote Job Entry (RJE) enables users at remote batch terminals to enter jobs into the computer system in the same manner as if they were on-site in the computer room. RJE allows files to be transferred between remote systems, and enables terminals attached to remote systems to be controlled by the host system.

Burroughs Network Architecture (BNA) software is designed to enhance the interaction of terminals with host CPUs in a network environment. BNA is also designed to facilitate a move into distributed data processing. Through the BNA 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 multiprocessing 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 communications between tasks being executed at various hosts; control of the creation, updating, and transfer of data from host to host; and handling of communications 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 NDL.

PROGRAM DEVELOPMENT: The *Logic and Information Network Compiler II (Linc II)* is a fourth-generation programming language which generates complete, on-line, realtime systems, including programs, data base descriptions, screen formats, transaction management, and network management. It is designed to do so with only one set of English-like specifications. The system includes the Linc Definition Language (LDL), a high-level, nonprocedural, business-oriented language used to identify and define the user's needs. LDL allows for a single system specification without regard to actual program and application construction and provides full syntax checking. It includes both the systems and data definitions and is used to define the report and inquiry requirements. The Linc System Generator takes the defined specifications and produces the programs required to establish, maintain, and report against the busi-

Burroughs B 3965

TABLE 3. INPUT/OUTPUT UNITS

Magnetic Tape Units	Number of Tracks	Recording Density, Bits/Inch	Encoding	Tape Speed, Inches/Sec.	Transfer Rate, Bytes/Sec.
B 9495-88	9	1600	PE	50	80,000
B 9495-82	9	1600	PE	75	120,000
B 9495-83	9	1600	PE	125	200,000
B 9495-24	9	1600	PE	200	320,000
	9	6250	GCR	200	1,250,000
B 9495-32	9	1600	PE	75	120,000
	9	6250	GCR	75	470,000
B 9495-33	9	1600	PE	125	200,000
	9	6250	GCR	125	780,000
Printers	Printing Speed	Print Positions	Horizontal Spacing, Chars./Inch	Vertical Spacing, Lines/Inch	Form Size, Inches
B 9246-6	650 lpm	132	10	6 or 8	4 to 20 in. wide
B 9246-12	1250 lpm	132	10	6 or 8	
B 9246-21	2000 lpm	132	10	6 or 8	

ness data. Linc optimizes the generated systems to the host Burroughs system, and eliminates redundant programming code and data elements as well as data and logic inconsistencies. The system provides for multiple independent accounting periods, support for batch programs, provisions for data integrity and security, transaction entry in any sequence, full on-line, realtime inquiry and maintenance of data, and an on-line "help" function.

The *Programmer Productivity System (PROPS)* is an on-line interactive facility for programmers to initiate and complete an entire program development process, including program creation, compilation, source file editing, interactive debugging, output examination, and on-line document retrieval from a single terminal.

The *Screen Design Facility (SDF)* features both screen painting facilities and data entry functions such as field verification, status checking, required field, and many more.

UTILITIES: Standard Utility functions provided with MCP include library maintenance, system log maintenance, conversion of data files from one format or media to another, and set/change program priorities for processor, memory, and scheduling before or during program scheduling and execution.

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

OTHER SOFTWARE: The *On-Line Data Entry System (Odesy)* is a sophisticated data entry and validation system using multiple on-line visual display units. It provides a generalized and generative "front end" for the existing application packages. It enables future packages to be designed to use its extensive editing facilities and thus reduces 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 applications programs.

Reporter II is a report writer designed to simplify the retrieval, analysis, and reporting of information maintained in

computer files. *Reporter II* accepts report specifications coded in a free-form report description language and generates a Cobol program tailored to produce the required report. The system can retrieve input data from multiple files and/or DMS II data bases, select data based on a wide range of criteria, perform arithmetic and statistical functions, sort data in ascending or descending order according to multiple keys, control access through a password system, produce automatically formatted reports, and create one or more files of extracted data for subsequent processing or reporting.

In addition to the basic (RP2) version, *Reporter II* is available in an Advanced version, an Audit version, and an On-Line version. *Reporter II (Advanced)* adds the capabilities for generation of multiple reports in one pass through the input data, creation of summary-only (matrix) reports, and controlled formatting for special reports or preprinted forms. *Audit-Reporter* extends the *Reporter II* system by providing auditors with effective software tools for testing and evaluating the records produced by an EDP system. The *On-Line Reporter* is an optional module that can be added to any of the three preceding systems to provide an on-line mode of operation that enables users at remote terminals to enter, generate, compile, and execute report programs.

The *Functional Logical Analysis of Machine Efficiency (Flame)* is a performance evaluation tool designed to measure both hardware and software performance. *Flame* collects raw data at specified intervals and writes it out to magnetic tape or disk for subsequent processing by the *Flamer* report program. Additional program modules provide supplementary reports, report summaries, special versions of the System Run Log, disk utilization analyses, and realtime monitoring of the B 3965 system.

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

The *Time Analysis and Billing System (Tabs)* utilizes the MCP-created system log to analyze computer usage and disburse the costs of the computer and related services according to a hierarchy of charge numbers. The system consists of a series of daily programs that analyze central processor, peripheral, and main memory utilization, multi-programming performance, and the total number of program executions and use time accumulated by each charge num-

Burroughs B 3965

TABLE 4. TERMINALS

MODEL	ET 1100	ET 2150	B 20	B 25
DISPLAY PARAMETERS				
Max. chars./screen	2,080	2,080	2,240	—
Screen size (lines x chars.)	24 x 80	24 x 80	28 x 80	29 x 80
Symbol formation	7 x 9 dot matrix	5 x 7 dot matrix	7 x 9 dot matrix	9 x 12 dot matrix
Character phosphor	P39 green	P39 green	Green	P31 green
Total colors/no. simult. displayed	—	—	—	—
KEYBOARD PARAMETERS				
Style	Typewriter	Typewriter	Typewriter	Typewriter
Character/code set	128 ASCII	128 ASCII	128 ASCII	128 ASCII
Detachable	Standard	Standard	Standard	Standard
Program function keys	10	10	10	10
OTHER FEATURES				
Buffer capacity	512K	512K	256K	256K
Tilt/swivel	Standard	Standard	Standard	Standard
Graphics capability	No	Yes	Yes	No
TERMINAL INTERFACE	RS-232-C, TDI	RS-232-C, TDI	RS-232-C, RS-422	RS-232-C, RS-422, Centronics parallel

ber. A monthly billing report reflects the total dollar value of computer services by charge number and prorates the charges for utility services based on the percentage use of the system. A computer charge summary provides a summary of accumulated month-to-date charges per account number for production runs, compilers, program testing, and use of program utilities.

Host-Link allows users of intelligent workstations such as the ET 2000 to access and utilize host resources. These may be devices directly connected to the host, devices within the host data communications network, or peripherals attached to other intelligent workstations. *Host-Link* consists of two distinct sets of software and is designed to operate on Burroughs mainframes. The first set of software, called *Host-Link Client*, resides on the ET 2000 and operates under MS-DOS. It contains a complete set of programs to manage the ET 2000 part of the connection. The second set of software, called *Host-Link Server*, resides on the mainframe and is responsible for maintaining all aspects of the system. The major function of *Host-Link Server* is to provide the various file and device handling services to the ET 2000 systems in the network.

Among the applications programs available from Burroughs are *BHAS II* (Burroughs Hospital Administration System) and *BHIPS* (Burroughs Hospital Information Processing System) *Thrift* (Savings and Loan Package) and *Total Banking System*; and *Scholastic System* for users in the field of education.

PRICING

POLICY: The B 3965 system is available for purchase or for lease under a 1-year, 3-year, or 5-year lease agreement. The standard lease agreement entitles the customer to unlimited use of the equipment and includes full-time equipment maintenance coverage (24 hours/day, 7 days/week). The standard maintenance agreement for purchased systems covers maintenance of the equipment for nine consecutive hours per day on Monday through Friday only; extended maintenance coverage is available at higher rates.

All maintenance charges listed in this report are for "metro 1" (city) districts.

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

SUPPORT: Various support package options are provided for under the Program Product Service Agreement. The availability of a particular service package depends on the product. Four services packages are available providing different levels of service. Software Product Support (PSA 1) is for users who will not require on-site program product problem assistance. Extended Software Product Support (PSA 2) is for users who will require on-site program product problem assistance. Centralized Software Product Support (PSA 3) covers selected program products needing only telephone-type service. Basic Software Product Support (PSA 5) is applied to certain products for which telephone and on-call services are not generally available.

All software is unbundled. Program products for the B 3965 system are offered under a plan which provides for the use of the products on a designated system on a month to month basis.

EDUCATION: Users can obtain the necessary training by paying for individual courses. The currently available courses range from 1 to 10 days in length, and fall into the following broad categories: Systems Support, Operations, Languages, Environmental (data base and data communications), and Applications.

TYPICAL CONFIGURATION: The following configuration illustrates a typical B 3965 system. The quoted prices include all necessary hardware, but no software.

B 3965

One central processor with 2MB memory, 1 operator display terminal, 2 minidisk drives, 2 DLP bases, 6 DLPs	\$120,000
3 B 9494-41 fixed disk drives (400MB)	61,500
1 B 9387-42 disk controller	30,000
4 B 9495-82/B 9499-14H PE tape units and controller	91,100
1 B 9246-21 line printer (2000 lpm)	69,300
1 B 9116 card reader (600 cpm)	11,373
6 ET 2150 workstations	20,970

TOTAL PURCHASE PRICE: \$404,243

Burroughs B 3965

EQUIPMENT PRICES

		Purchase Price (\$)	Monthly Maint.* (\$)	1-Year Lease** (\$)	5-Year Lease** (\$)
► PROCESSORS AND MAIN MEMORY					
B 3955	Central System; includes CPU with 2 megabytes of main memory, I/O processor, operator display with keyboard, 2 mini-disk drives for system maintenance, 2 DLP Bases, console DLP, 2 disk drive DLPs, line printer DLP, and a card reader DLP	120,000	634.00	NA	NA
B 3009-1MB	One-megabyte Memory Increment for B 2925	12,000	74.40	725	661
B 3009-3MB	Three-megabyte Memory Increment	25,000	237.00	1,750	NA
SYSTEM OPTIONS					
B 3905-91	Additional DLP Base	10,500	31.60	445	374
B 3095-95	Extension Cabinet	26,251	71.60	1,103	915
DATA LINK PROCESSORS					
B 3376-95	Shared Systems Processor DPL	12,601	47.60	541	464
B 3376-94	Host Interface Adapter; B X900 to SSP DLP	2,588	34.80	119	108
B 3373-90	5N Disk File DLP	4,620	36.60	028	177
B 3304-90	Disk Drive DLP	4,620	24.70	197	172
B 3304-91	Block Level Transfer Disk DLP	4,620	40.90	248	180
B 3393-90	NRZ Magnetic Tape DLP-3	4,043	49.60	174	156
B 3395-91	80/120/200KB PE Magnetic Tape DLP	4,043	24.70	172	154
B 3395-92	470/1250/120-320KB GCR/PE Magnetic Tape DLP	4,620	36.60	202	177
B 3395-93	NRZ Magnetic Tape DLP	4,043	49.60	183	161
B 3246-94	Line Printer DLP for B9246-6/12	5,175	46.80	164	146
B 3246-95	Line Printer DLP for B9246-21	5,175	50.10	151	133
B 3110-90	B 9115/B 9116/B 9117 Card Reader DLP	2,888	24.70	129	109
B 3137-90	Document Processor DLP for B9190	8,409	36.60	349	305
B 3303-90	B 874 DLP	3,396	24.70	147	131
B 3368-90	CP 3680 DLP	4,620	53.70	168	151
B 3351-94	Universal Uniline DLP-3	3,676	36.60	161	139
B 3341-9	Operator Display DLP-4	4,232	20.90	177	155
MASS STORAGE					
B 9484-12	Disk Pack Drive; 252 megabytes, single spindle	30,000	126.00	1,440	1,080
B 9494-41	Fixed Disk Drive; 400 megabytes, dual spindle	21,500	119.00	1,246	1,015
B 9494-5	Fixed Disk Drive; 542 megabytes, single spindle, interlaced	26,500	116.00	1,624	1,219
B 9387-51	Controller; 1 x 8	15,000	66.80	694	524
B 9387-52	Controller; 2 x 8	20,000	100.00	922	692
B 9387-24	4 x 16 Disk Exchange	20,000	66.80	904	679
B 9387-26	6 x 16 Disk Exchange	30,700	78.00	1,385	1,040
B 9387-28	8 x 16 Disk Exchange	41,400	120.00	1,860	1,395
B 9387-30	2X Expander	10,700	15.00	480	360
MAGNETIC TAPE UNITS					
B 9495-88	Magnetic Tape Unit; 80 KBS, 501 IPS, PE only	11,551	175.00	507	424
B 9495-82	Magnetic Tape Unit; 120 KBS, 75 IPS, PE only	18,100	152.00	734	576
B 9495-83	Magnetic Tape Unit; 200 KBS, 125 IPS, PE only	22,447	173.00	926	724
B 9495-24	Magnetic Tape Unit; 1250/320KBS, 200 IPS, GCR	36,225	272.00	1,315	1,061
B 9495-32	Magnetic Tape Unit; 470/120KBS, 75 IPS, GCR	21,736	182	920	661
B 9495-33	Magnetic Tape Unit; 780/200KBS, 125 IPS, GCR/PE	24,917	192.00	1,044	748
B 9499-14S	PE, PE/NRZ Controller; 50 IPS; 1 x 4	11,465	44.50	421	324
B 9499-14M	PE, PE/NRZ Controller; 75 IPS; 1 x 4	19,100	132.00	745	573
B 9499-14H	PE, PE/NRZ Controller; 125 IPS; 2 x 8	19,100	132.00	745	573
B 9499-18S	PE, PE/NRZ Controller; 50 IPS; 1 x 8	12,350	44.50	451	353
B 9499-18M	PE, PE/NRZ Controller; 75 IPS; 1 x 8	21,060	132.00	786	605
B 9499-18H	PE, PE/NRZ Controller; 125 IPS; 1 x 8	21,060	132.00	786	605
B 9499-28S	PE, PE/NRZ Controller; 50 IPS; 2 x 8	14,465	97.40	537	419
B 9499-28M	PE, PE/NRZ Controller; 75 IPS; 2 x 8	51,240	288.00	2,138	1,260
B 9499-28H	PE, PE/NRZ Controller; 125 IPS; 2 x 8	51,240	288.00	2,138	1,260
B 9499-2XM	PE, PE/NRZ Controller; 75 IPS; 2 x 16	53,940	288.00	2,247	1,450
B 9499-2XH	PE, PE/NRZ Controller; 125 IPS; 2 x 16	53,940	288.00	2,247	1,450
B 9499-3XM	PE, PE/NRZ Controller; 75 IPS; 3 x 16	83,310	425.00	3,330	2,280
B 9499-3XH	PE, PE/NRZ Controller; 125 IPS; 3 x 16	83,310	425.00	3,330	2,280
B 9499-4XM	PE, PE/NRZ Controller; 75 IPS; 4 x 16	110,200	563.00	4,362	3,005
B 9999-4H	NRZ Option; 75/125 IPS	788	7.40	32	27
1NRZ	NRZ Control Module	2,731	43.30	97	81
B 9499-21	GCR/PE Controller; 1 x 8	42,634	249.00	1,473	1,183
B 9499-22	GCR/PE Controller; 2 x 8	85,288	495.00	2,954	2,356
B 9499-23	GCR/PE Controller; 3 x 8	127,899	746.00	4,416	3,538

*Maintenance rates are for nine hours, five days per week.

**Lease prices include 24-hour, 7-day maintenance.

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		Purchase Price (\$)	Monthly Maint.* (\$)	1-Year Lease** (\$)	5-Year Lease** (\$)
MAGNETIC TAPE UNITS (Continued)					
B 9499-24	GCR/PE Controller; 4 x 8	170,553	994.00	5,878	4,716
B 9499-42	Electronic Exchange for B 9499-22; 2 x 16	7,751	25.90	281	219
B 9499-43	Electronic Exchange for B 9499-23; 3 x 16	9,680	34.50	365	302
B 9499-44	Electronic Exchange for B 9499-24; 4 x 16	11,356	34.50	427	340
B 9999-3	Dual Host Switch	5,624	20.30	182	149
CARD READERS					
B 9115	Card Reader; 300 cpm, 80 column	8,608	77.80	353	276
B 9116	Card Reader; 600 cpm, 80 column	11,373	112.00	478	375
B 9117	Card Reader; 800 cpm, 80 column	12,952	134.00	536	420
PRINTERS					
B 9246-6	Band Printer; 650 lpm	14,700	195.00	575	499
B 9246-12	Train Printer; 1250 lpm	42,500	407.00	1,615	1,340
B 9246-21	Train Printer; 2000 lpm	69,300	721.00	3,229	2,629
DOCUMENT PROCESSORS					
B 9190-1C	Document Processor; 1000 dpm, 4 pocket base; includes MICR E13B, basic off-line sort, 12 pockets, control interface and DLP	76,662	972.00	3,959	3,364
B 9190-2C	Document Processor; 1625 dpm, 4 pockets; requires one control interface and at least one character recognition module	47,205	893.00	2,929	2,539
B 9990-21	Character Recognition System; MICR E13B, Single Read	16,973	90.40	740	593
B 9990-22	Character Recognition System; MICR E13B, Double Read	46,695	179.00	1,922	1,516
B 9990-90	4A Control or DLP Interface	2,085	5.90	82	64
B 9990-91	3A Control Interface	1,752	5.60	70	55
B 9195-20C	Document Processor; 20 pockets, handler and controller	348,414	3,871.00	14,207	12,159
B 9195-24C	Document Processor; 24 pockets, handler and controller	378,669	4,158.00	15,306	13,813
B 9195-28C	Document Processor; 28 pockets, handler and controller	405,795	4,445.00	16,419	14,051
B 9195-32C	Document Processor; 32 pockets, handler and controller	434,382	4,735.00	17,530	15,005
B 9995-72	Additional Memory; 4K bytes	9,999	30.30	425	353
COMMUNICATIONS EQUIPMENT					
B 874-4	System and Communications Processor includes 4-megahertz processor and 16K bytes of control storage, integrated host interface, and 32-line adapter cluster	23,200	260.00	1,530	1,192
B 32-2	User Memory; 16KB for B 874-4	2,521	43.60	121	110
B 74-1	Memory Expansion Module for B 874-4 systems greater than 32K bytes	5,550	102.00	238	204
B 74-5	Dual Host Switch for B 874-4 processor	2,794	34.10	105	88
B 74-7	BDLC Feature for B 874-4 processor	1,849	18.20	69	58
B 551-1	Direct Connect Dual Line Adapter; two-wire, maximum data rate 9600 bps	2,006	11.40	58	48
B 551-2	Direct Connect Dual Line Adapter; TTY-compatible, maximum data rate 300 bps	1,234	11.40	48	43
B 551-3	Direct Connect Dual Line Adapter; balanced differential interface, maximum data rate 19,200 bps	1,644	11.40	60	55
B 551-6	Synchronous/Asynchronous Data Set Dual Line Adapter; maximum data rate 9600 bps	1,234	11.40	48	43
B 551-7	BDLC Single Line Adapter for B 874-4; maximum data rate 9600 bps	1,481	16.00	57	50
B 551-12	Synchronous/Asynchronous Single Line Adapter with Addressing; maximum data rate 9600 bps	1,029	11.40	43	37
B 974-CP	Communications Processor System; includes cabinet, 64KB memory, inbuilt disk, dual adapters, ISC local Hub and adapter cable, B 974 DLP, dual channel port kit, extended backplane	64,530	420.00	3,849	2,908
CP3682	Data Communications System; includes processor with 512K bytes of memory; 20MB disk subsystem with interface, real-time clock, Dual Channel Port Controller (DCPC), diagnostic adapter, diagnostic modem, console adapter, firmware set and system cabinet	53,822	550.80	2,778	2,202
CP3682-01	Redundant Data Communications System; includes second CP3682 system plus CP3643-01 Dual Port Interface Unit with cable, CP3644-01 Dual System I/O Interface Unit with cable, CP3645-01 I/O Expansion Cabinet, and CP3646-01 I/O Port Extender	52,225	481.10	2,665	2,115

*Maintenance rates are for nine hours, five days per week.

**Lease prices include 24-hour, 7-day maintenance.

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COMMUNICATIONS EQUIPMENT (Continued)		Purchase Price (\$)	Monthly Maint.* (\$)	1-Year Lease** (\$)	5-Year Lease** (\$)
CP3610	Add-On Memory Module; 256K bytes	9,323	95.20	409	325
CP3610-02	Upgrade Memory Module; 512K bytes	12,698	74.97	567	452
CP3610-03	Add-On Memory Module; 256K bytes	9,323	51.77	417	333
CP3610-04	Add-On Memory Module; 512K bytes, high speed error correcting	11,115	57.12	498	397
CP3620-1	Host Interface Unit	2,626	15.90	115	94
CP3630-1	Eight-Line Microprocessor-Based Asynchronous Communications Adapter	5,408	31.79	242	193
CP3631-1	Two-Line Microprocessor-Based Synchronous/Asynchronous Adapter	2,416	19.13	108	90
CP3632-1	Direct Connect Interface Unit	368	2.13	21	13
CP3633-1	Automatic Calling Unit Adapter	1,260	7.40	48	37
CP3640-2	Diagnostic Modem	688	4.51	33	27
CP3641-1	System Console	3,151	26.52	112	91
CP3641-02	Console Adapter	1,588	7.14	73	59
CP9582	Communication Processor; includes a cabinet with 65KB memory power supply, four 3MHz processors, one DCP CSC card, one 65KB memory module, two 524KB memory modules, and extended back-plane	23,228	93.00	1,125	900
CP9502-3	Additional Processor; 3MHz	1,750	17.80	73	59
CP9512-1	Memory Module; 65K bytes	750	10.90	34	28
CP9512-3	Memory Module; 262K bytes	1,750	25.40	79	65
CP9512-4	Memory Module; 524K bytes	3,000	43.70	134	109
CP9530	Line Expansion Module (LEM)	5,697	33.00	191	153
CP9530-1	Line Expansion Unit (LEU)	3,886	16.50	140	113
CP9530-2	LEU Dual Host Option	457	3.90	19	16
CP9503-8	LEU-DCP Interface Kit	484	3.90	21	18
CP9503-10	Additional DCP Kit	475	4.30	23	19
B 9361-1	Operator Display Terminal	1,471	38.20	61	49
B 9361-2	Operator Display Terminal	2,095	22.00	131	123
CP9521-2	Operator Display Terminal Control	630	4.20	25	22

TERMINALS

ET 1100	Terminal Workstation; 14-inch, with keyboard, RS-232-C/TDI data communications	1,580	20.33	105	79
ET 2150	Terminal Workstation; 14-inch, monochrome, with keyboard, bit-mapped graphics capabilities, 512K-bit RAM	3,495	27.00	222	179
ET 2241	Terminal Workstation; 14-inch, color, with keyboard, bit-mapped graphics capabilities, 256K-bit RAM, BDAA data communications	3,495	21.00	165	129
B 21-1TS	Microcomputer; level 1 workstation, 15-inch, with keyboard, 256K-bit RAM, RS-422 channel	2,600	509.00	—	—
B 25	Microcomputer; workstation 12-inch, monochrome, with keyboard, 256K-bit RAM, RS-422, RS-232, Centronics parallel interface	2,620	29.00	—	—

*Maintenance rates are for nine hours, five days per week.

**Lease prices include 24-hour, 7-day maintenance.

SOFTWARE PRICES

Product Description	Annual Product Service Agreements		
	Monthly License Fee (\$)	PSA 2 (\$)	PSA 1 (\$)
B3000 SSF Software Facilities Program; includes the Master Control Program MCP or MCP IX, Network Definition Language (NDL), Gemcos-Basic (MCB), B 874 Network Definition Language (NDL), and one compiler	925	4,828	2,795

Burroughs B 3965

Product Description (Continued)		Annual Product Service Agreements		
		Monthly License Fee (\$)	PSA 2 (\$)	PSA 1 (\$)
B3000 COB	Cobol Compiler ANSI 74	135	690	390
B3000 RPG	RPG Compiler	135	690	399
B3000 PAS	Pascal Compiler	135	567	228
B3000 BAS	Basic Compiler	135	—	—
B3000 FR1	Fortran 77 Compiler	135	248	616
B3000 WFL	Work Flow Management Language	70	345	200
B3000 FLM	Flame Monitor	23,575	502	290
B3000 BND	Program Binder	30	144	83
B3000 TA2	Time Analysis and Billing System II TABS	75	336	178
B3000 LN2	Linc II	2,150	13,200	7,140
B3900 WPC	Props	800	2,880	1,440
B3900 SDF	Screen Design Facility SDF	125	715	415
B3900 IRP	Interactive RPG Utility	50	285	165
DC3000 HLS	Host-Link	315	972	534
B3000 MCB	Gemcos Basic	290	1,293	418
B3000 MCA	Gemcos Advanced	506	2,690	1,557
B3000 MCT	Gemcos Total	651	3,458	2,002
B3000 CE1	Cande	90	470	272
B3000 MC7	Message Control System Generator	130	—	—
CP3600 DCS	Data Communications Software	317	—	4,800
CP3600 SCS	Standby Communications Software	158	—	—
B3000 DE2	Odesy	235	1,163	673
B3000 DES	Data Entry System	250	1,254	726
B3000 AUD	Audit Reporter	755	—	—
B3000 ARP	Advanced Reporter II	555	—	—
B3000 RP3	Reporter III	465	2,015	1,105
B3000 RPO	On-Line Reporter (requires AUD)	55	256	148
B3000 OR3	On-Line Reporter III	55	285	165
B3000 ND1	Network Definition Language	220	1,497	506
B3000 DM2	Data Management System II	475	2,508	1,452
B3000 DMI	DMS II Inquiry	120	627	363
B3000 DM1	Data Management System I	705	—	—