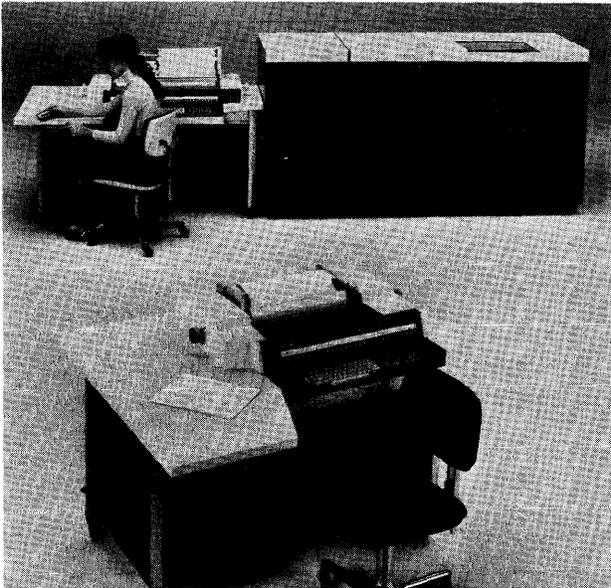


# Burroughs B 700



*Burroughs' new AE 301 Audit Entry Computer (foreground) can be used as an off-line data entry station to prepare cassette tape for entry into the B 700 computer system shown in the background. From left to right are the B 700 console with cassette tape subsystem, processor, dual disk cartridge drive, and line printer.*

## MANAGEMENT SUMMARY

The B 700 systems, released by Burroughs on March 1, 1973, fit snugly in the gap between the company's lower-priced, keyboard-oriented L 8000 Series accounting computers, announced five months earlier, and the more expensive, batch-oriented B 1700 systems announced in June 1972. First customer shipments of the B 700 were started in May 1973, with typical systems rentals ranging from \$950 to \$2,600 per month. The B 700 represents an excellent design compromise between the existing L 8000 and B 1700 systems by combining the keyboard and forms handler so familiar to approximately 60,000 current users of the Burroughs L and TC Series systems with many of the general-purpose computer characteristics in larger Burroughs systems.

Along with the B 700 systems, Burroughs announced the AE 301 Audit Entry computer — a standalone, key-to-cassette data entry device intended for off-line data collection. The AE 301 prepares a line-by-line journal listing of all input transactions for audit trial purposes and provides basic user storage for edit criteria and data validity checking. Input transactions are also recorded on a standard tape cassette for data transfer to the main B 700 console. This adds a welcome off-line data preparation/audit entry capability to Burroughs' small-scale computers, but at a considerably higher per station cost than either conventional keypunches or the newer key-to-tape and shared-processor key-to-disk systems when arranged in large configurations. ➤

By bridging the gap between the smaller, keyboard-oriented L 8000 and the larger, batch-oriented B 1700, the B 700 forms a logical and effective addition to Burroughs' small-scale computer lineup. It represents a happy combination of the keyboard and forms-handling features of the L and TC Series systems with many of the processor and peripheral aspects of the B 1700 systems.

## CHARACTERISTICS

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

**MODELS:** Processors B 705 and B 711 used in packaged B 706, B 707, B 708, B 716, B 717, and B 718 Data Processing Systems.

## DATA FORMATS

**BASIC UNIT:** 64-bit word. Each word in memory can hold 15 decimal digits (4 bits each) plus sign, 8 alphanumeric characters, or up to 4 instructions. (NOTE: Memory capacities are usually expressed in 8-bit bytes, with 8 bytes equaling one 64-bit word).

**FIXED-POINT OPERANDS:** Variable length depending upon the "PICTURE" command definition in COBOL or RPG.

**FLOATING-POINT OPERANDS:** No provision for floating-point arithmetic is offered.

**INSTRUCTIONS:** Variable instruction format is 4-10 digits in length.

All instructions are of the decimal variety. Arithmetic instructions are of the two-address type. Memory reference instructions have a 16-bit address specification field, and use 2 bits to indicate registers that are used to develop an effective address, and 8 bits for the operation code.

**INTERNAL CODE:** ASCII.

## MAIN STORAGE

**STORAGE TYPE:** Magnetic core main memory; bipolar MOS used for 512 56-bit words of read-only "nanomemory" or control memory.

**CYCLE TIME:** Read-only nanomemory — 80 nanoseconds per 56-bit word; main memory — 1 microsecond or 2 microseconds per 16-bit read/write cycle.

**CAPACITY:** B 706, B 707, B 708-32,768 or 40,960 eight-bit bytes; B 716, B 717, B 718-32,768, 40,960, or 49,152 bytes.

**CHECKING:** Parity bit associated with 8-bit byte.

**STORAGE PROTECTION:** Available only for the area used by the Interpreter (see Central Processors, General, below). ➤

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➤ Each packaged B 700 system is built around either a 500,000 cycle/second B 705 processor or a 1,000,000 cycle/second B 711 processor, and each is fully able to support either a keyboard-oriented environment or a card-oriented environment depending upon the B 700 model. As of the date of announcement, however, one notable absence from the functional capabilities of the B 700 systems was any form of data communications capability, although communications is promised for delivery before the end of 1974.

The competitive position of the B 700 systems is a strong one. Even though several aspects of the system are not as strong as they should be (COBOL needs host support on the B 3500/4700 and the AE 301 is a comparatively expensive off-line data entry subsystem for multistation environments and there exists a current – albeit temporary – lack of data communications), the B 700 adds significant strength to Burroughs' already strong offerings in the small business computer market, and should be enthusiastically received by Burroughs L and TC Series users. Burroughs points to the B 700's Business Management Systems applications programs, convenient interrupt/resume function, and certain peripheral subsystems as advantages over IBM's enormously popular System/3 Model 6. A particular advantage of the B 700 is the availability of much faster line printers and card I/O units for the Burroughs system.

With service provided worldwide by Burroughs own support personnel, first-time users, as well as current computer users facing decentralized processing requirements, are well advised to give serious consideration to the B 700. □

### ➤ CENTRAL PROCESSORS

**GENERAL:** The B 700 processors feature dynamically variable microprogrammed logic, in which the processor has a minimal predefined structure. Under this design, a fundamental systems control program resides in a high-speed bipolar read-only-memory (ROM) called the "nanomemory." A second "shared" main memory is provided for use by both the applications program being executed and a microprogram system called the "Interpreter." The Interpreter consists of the detailed logic required to convert or interpret the object-language version of an application pro-

gram into the basic, Boolean-type manipulations or I/O operations that are directly executable by the B 700 processor.

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

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

The Interpreter itself is designed to facilitate execution of an "S Language" or machine-level language for a virtual machine best suited to a particular high-level language. For the B 700 systems, COBOL and RPG are both supported by the same Interpreter. The logical structure of a B 700 system, including instruction repertoire, I/O configuration, and buffer requirements, is "bound" at a run time so that the B 700 system looks as if it were custom-developed to execute a specific program.

No multiprogramming is possible in the B 700. This situation has led to the development of an "interrupt/resume" or checkpoint/restart function that rolls out the present status of the machine and its processing onto disk, allowing a high-priority job to be then loaded into the system. Following completion of the high-priority run, the first program can be restored and processed.

**REGISTERS:** Four index registers are provided in the software. Indexing is specified by 2 bits in the instruction word.

**INDIRECT ADDRESSING:** None.

**INSTRUCTION REPERTOIRE:** Approximately 200 instructions are defined at the user ("S") level. These instructions are accessed by micro commands at the machine ("M") or Interpreter level. Because the B 700 is a "soft" machine, the entire instruction set can be altered to any repertoire desired by the user through micro-programming, although this practice is actively discouraged by Burroughs. ➤

### SUMMARY DATA FOR PACKAGED B 700 SYSTEMS

	B 706	B 707	B 708	B 716	B 717	B 718
BASIC SYSTEM RENTAL	\$1,061	\$1,820	\$1,745	\$1,241	\$2,000	\$1,925
CENTRAL PROCESSORS –						
Model	705	705	705	711	711	711
Cycle Time, micro-seconds	2.0	2.0	2.0	1.0	1.0	1.0
Main Memory Sizes	32K, 40K	32K, 40K	32K, 40K	32K, 40K, 48K	32K, 40K, 48K	32K, 40K, 48K

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**PERIPHERALS/TERMINALS**

DEVICE	DESCRIPTION	SPEED
<b>MAGNETIC TAPE</b>		
A 9490 Cassette	Up to four can be attached; 30 ips, 96k bytes of storage	3K bytes/sec
A 9491-2 Drive Unit	Industry compatible, 12.5 ips, 9-trk, 800 bpi	10k bytes/sec
<b>LINE PRINTERS*</b>		
A 988	120-position, 48-char, ASCII	164 lpm
A 9249-1	132-position, 48/64-char, ASCII	90 lpm
A 9249-2	132-position, 48/64-char, ASCII	180 lpm
A 9247	120/132-position, 16/64/96-char, ASCII/ EBCDIC/BCD	400 lpm
<b>CARD EQUIPMENT**</b>		
A 9114-1	Reader, 80-col	200 cpm
A 9119-1	Reader, 96-col	300 cpm
A 9418-2	80-col. Reader/Punch/Data Recorder	200/45/45 cpm
A 9419-2	Reader/Punch/Data Recorder; 96-col (off-line as keypunch/verifier/ Multipurpose Unit	300/60/60 cpm
A 9419-6	(like 9419-2 plus six-pocket sort)	300/60/60 cpm
<b>PAPER TAPE EQUIPMENT</b>		
A 9122-1	Reader, 5-8 channel	40 cps
A 9222-1	Punch, 5-8 channel	40 cps

\*Limit one per system.

\*\*Limit one 96-col. card controller; two 80-col. card controllers per system.

► **INSTRUCTION TIMINGS:** All times are expressed in microseconds for 5-digit operands at the user level.

	<u>B 711</u>
Move	193
Add/Subtract	430
Multiply*/Divide**	3,130
Compare & Branch	340

\*3 digits.

\*\*Quotient of "one" is 1092 microseconds; add approximately 180 microseconds for each increment of the quotient digit value until going from 9 to 10, 19 to 20, etc., at which time approximately 1400 microseconds are subtracted.

Note that the B 705 processor is otherwise identical to the B 711 except that it is slightly slower by a uniform amount.

**INTERRUPTS:** 7 levels.

**CONTROL STORAGE:** 512 words of 56-bit bipolar ROM. About 5,000 bytes of the main memory are required for storage of the basic Interpreter.

**INPUT/OUTPUT CONTROL**

**I/O CHANNELS:** Each type of peripheral device or sub-system except the console and the first disk drive can use any available I/O control, and each I/O control, in turn, requires an appropriate "slot" in the central processor.

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

**CONFIGURATION RULES:** The maximum number of I/O controls is 8 in all of the B 700 Series systems. Two of these controls are dedicated to the console and a disk drive. (A disk drive is required on each system; and only one drive of any given type can be used on a B 700.)

**MASS STORAGE**

**A 9480/9481 DISK CARTRIDGE MEMORY SUB-SYSTEMS:** Two models are available: A 9480-12 with dual removable drives for up to 4,667,120 bytes (all B 700's); and A 9481-12 with dual removable drives for up to 9,354,240 bytes (B 711's only).

Each drive accommodates one disk cartridge; records data in 180-byte segments; has an average head position time of 60 milliseconds; average rotational delay of 20 milliseconds; and data transfer rate of 193,000 bytes/second.

**INPUT/OUTPUT UNITS**

See Peripherals/Terminals table for units other than the AE 301.

**AE 301 AUDIT ENTRY COMPUTER:** This off-line data entry station is intended for use as a keyboard-to-cassette source data recorder. With about 576 64-bit words of main memory available for the user, the AE 301 can provide an

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► audit-trial journal record of all transactions, as well as apply a limited amount of editing capability. Only one cassette is available with the AE 301 as a standard feature, and it can contain up to 3,000 96-column card-image records for data capture.

User programs for the AE 301 are prepared via a Program Generator or the L/TC COBOL compiler, both of which must be used on a larger Burroughs B 3500, B 3700, or B 4700 support system. If desired, the cassette can be used for program loading, and up to 40 different formatting/editing programs can be stored for loading into the AE 301 main memory. However, the more typical way of loading programs into the AE 301 is via paper tape.

The AE 301 console includes a 15½" front-feed forms handler and 16 Program Select keys.

### DATA COMMUNICATIONS

A data communications capability has been promised for the B 700 Series systems with first customer shipments of communications-oriented B 700 systems expected before the end of 1974.

### SOFTWARE

**SYSTEM CONTROL PROGRAM:** The central component of Burroughs software support for the B 700 is the System Control Program (SCP), which includes the Interpreter, a highly modular microcoded system that implements all of the functions of the B 700 system. An I/O manager and "soft" controllers for B 700 I/O processes are contained in the SCP to handle most of the functions ordinarily performed by hardware controllers.

A self-contained audit entry function is also provided by the SCP. This function, which can be omitted in favor of a stand-alone, off-line AE 301 Audit Entry Computer, uses the B 700's split platen to produce a journal record on one side of the carriage.

The full size of the Interpreter is about 16,000 bytes, some 5,000 of which form a nucleus that is always resident in main (shared) memory. Various other nonresident segments of the Interpreter are brought into main memory as they are needed (Dynamic Interpreter Configurability) for each program.

Compilation of programs written in B 700 COBOL must be performed on a Burroughs B 3500, B 3700, or B 4700 computer with at least 90K bytes of main storage.

A COBOL compiler that permits compilation on the B 700 system itself is planned for future release.

**PROGRAMMING:** The principle programming language for the B 700 series computers is RPG. The B 700 RPG language is generally compatible at the source-language level with IBM's System/3 RPG I or II, as well as with the B 1700 RPG, and runs directly on the B 700. With the advent of self-compileable COBOL, users may well find that language to be at least as efficient to use as the RPG language.

**APPLICATIONS:** Burroughs offers ready-to-use Business Management Systems (BMS) packages for specific commercial applications: Wholesale Management System, Distributor Management System, and Manufacturing Management System. Each BMS includes a general purpose payroll package, general accounting programs, etc. plus specific applications-oriented programs. The general purpose programs can equally well be used in a wide variety of business environments other than those mentioned above.

The full Business Management Systems packages are offered at a one-time charge of \$7,100 or \$9,500 each, depending upon whether or not user training and initial setup is included. Prices of the individual modules within each BMS range from \$1,500 to \$4,470. The BMS's are offered on limited or unlimited time license plans. The basic payment schedules for these are a one-time payment, 12 equal payments, or payments over a 3- or 5-year extended term.

### PRICING

**POLICY:** The standard equipment lease agreement includes equipment maintenance and permits use of the equipment during one 8-hour period per day. Additional extra-shift charges will not exceed 15 percent of the basic monthly rental for full maintenance coverage on a 24 hours/day, 7 days/week basis.

In addition to the 1-year leases shown in the equipment price list, Burroughs offers 3-year and 5-year leases at discounts of approximately 5 and 10 percent, respectively.

**SUPPORT:** Burroughs technical assistance is available to B 700 users at a price of \$150 per day, in half-day increments.

B 700 Series users can obtain appropriate education and training either as part of a Business Management System or by paying for the individual courses they need.

**EQUIPMENT:** All necessary control units are included in the following system prices. Rental prices are for one-year lease including maintenance.

**MINIMUM 706 AUDIT ENTRY SYSTEM:** Consists of a 0.5 Mhz processor with 32 KB of memory, a 26"-carriage system console, and 4.6 MB of disk storage. Monthly rental and purchase prices are \$1,061 and \$43,350, respectively.

**FULL-SCALE AUDIT ENTRY SYSTEM:** Consists of a 1 Mhz processor with 48 KB of memory, a 26"-carriage system console, 9.2 MB of disk storage, a 400-lpm printer, 2 magnetic tape cassette subsystems, and an AE 301 Audit Entry Computer System. Monthly rental and purchase prices are approximately \$2,600 and \$103,000, respectively.

**TYPICAL CARD SYSTEM:** Consists of a 0.5 Mhz processor with 32 KB of memory, a 26"-carriage system console, 4.6 MB of disk storage, 164 lpm printer, 96-column card/reader/punch/printer, and 96-column off-line card data recorder. Monthly rental and purchase prices are \$1,995 and \$79,615, respectively. ■