Burroughs CP 9500 Series Communications Processors

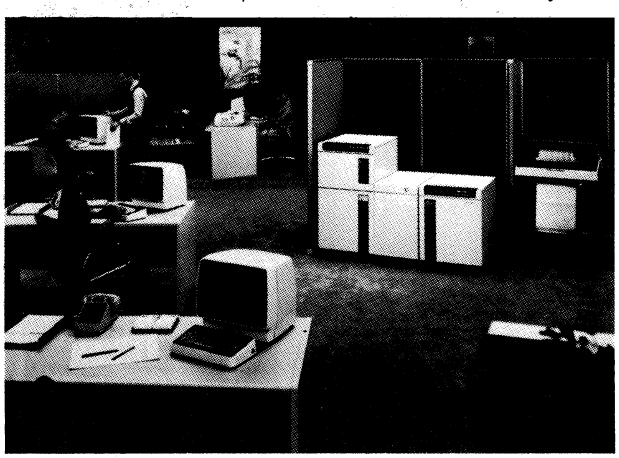
MANAGEMENT SUMMARY

UPDATE: *This report is being updated to show changes that have been made to the Burroughs' line of communications processors. The CP 9400 line is no longer being marketed. The CP 9558-1 and the CP 9572 are also no longer being marketed. The CP 9500 line currently consists of the CP 9582 and the CP 9585.*

Burroughs introduced the CP 9500 Series in 1980. The original members of this series superseded the earlier B 870, B 860, and B 770 Series communications processors. The CP Series is used to interlink remote data processing operations and local terminal networks with each other and with central computers (Burroughs or non-Burroughs), and can also serve as hosts in distributed processing networks. The newest member of the Burroughs CP 9500 family, the CP 9585 communications processor system, was announced in October 1984. The CP 9582 and the CP 9585 are similar in makeup and operation; the main difference is that the CP 9585 can accommodate an inbuilt Winchester hard disk, not available in the CP 9582.

The CP 9582/5 use a multiprocessor architecture that has characterized the entire CP 9500 Series models, and accommodates four to eight microprocessors. All processors in the system are Burroughs' Basic Data System (BDS) microprocessors, which operate concurrently at 3MHz. Each processor operates in a semiautonomous manner, executing instructions from its own memory module and performing a specific function.

Four processors are required in the basic system configuration. One processor (Processor #1 in Figure 1) is responsible for executing the Master Control Program (MCP), the operating system that directs the activities of the CP 9585 system. This processor/memory set houses and executes all the microcoded control routines associated with the MCP except for disk functions. It also provides data storage buffers as needed for I/O devices attached to the system.



Burroughs CP9500 system (right of center) is shown here with the B 9350 line expansion module (abutting main cabinet) and a B 9246-6 600 LPM printer.

Burrough's CP 9500 Series of communications processors are used to interlink remote data processing operations and local networks of terminals with each other and with central computers to form data communications networks of various sizes. The CP 9500 Series communicates with Burroughs and non-Burroughs computers and terminals over switched or leased lines and through packet-switching networks. The CP 9500 Series processors can also function as hosts in distributed processing networks.

The CP 9585 communications processor includes four to eight 3MHz microprocessors and a maximum main memory of 3.4M bytes. Up to 39 data communications lines can be installed in the CP 9585 cabinet; and with CP 9530 Line Expansion Modules, a maximum of 128 lines can be supported.

FUNCTION: Communications processor, remote concentrator, distributed processor.
HOST COMPUTERS SUPPORTED: Burroughs, IBM.
ARCHITECTURE SUPPORTED: Burroughs Network Architecture (BNA).
OPERATING SOFTWARE: Computer Management System (CMS), Computer Management Distributed Information System (CMDIS).
COMPETITION: IBM Corporation.
PRICE: Depends upon configuration.

CHARACTERISTICS

VENDOR: Burroughs Corporation, Burroughs Place, Detroit, MI 48232. Telephone (313) 972-7000.

DATE OF ANNOUNCEMENT: CP 9500 Series—March 1980; CP 9582—June 1982; CP 9585—October 1984.

DATE OF FIRST DELIVERY: CP 9500 Series—May 1980; CP 9582—June 1982; CP 9585—October 1984.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: Burroughs Corporation.

CONFIGURATION

The CP 9500 Series Communications Processor Systems are built on a multiprogramming and multiprocessing architecture similar to that utilized by Burroughs for their B 900 Series of computers. The systems are designed as small compact units and provide high-density disk storage with printer back-up. They can be controlled either locally by a directly attached dedicated console, or remotely using an ET 1100 display terminal. Two line printers, three fixed disk drives, and a 6MB diskette subsystem were introduced with the CP 9500 Series.

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Burroughs CP 9500 Series Communications Processors

The operating system processor is interrupted by the other processors as MCP services are needed, and it interrupts the other processors for passage of control information. This processor controls the system's time-of-day clock, the operator display terminal, and other nondisk peripherals. The memory set with this processor contains 524,288 bytes.

The second processor (Processor #3 in Figure 1) provides direct interfacing to attached disk device(s). This file management processor/memory set houses and executes the logical and physical disk I/O functions. The memory module with this processor contains 65,536 bytes for storage of its functions. An additional 16K bytes of Read Only Memory (ROM) attached to the processor includes logic to provide system load functions. The ROM also provides the logical capability to perform diagnostic testing automatically each time the basic system load functions are performed. A disk file cache module, including 262,144 or 524,288 bytes of memory, can optionally be installed with the file management processor. By storing frequently used data in its fast-access memory, the disk file cache module can reduce file access time.

The third processor (Processor #8 in Figure 1) provides a direct interface to data communications lines attached to the system. The data communications processor/memory set houses and executes the network handling code generated to user specifications by Burroughs Network Definition Language. Other functions performed by the data communications processor (DCP) include establishment of line protocol for attached terminal devices and first-level error recovery. The memory module with this processor contains 65,536 bytes for storing its functions. It is possible to use the data communications processor for applications processing when data communications processing is terminated. In that case, the DCP must have the 262,144 byte memory module.

Of the eight processors that the CP 9582/5 system can accommodate, up to four processors can be used as data communications processors. Each of the optional DCPs can be configured with 65,536 bytes, providing a potential maximum of 262,144 bytes of memory for data communications functions. No single data communications processor needs more than 65K bytes.

The fourth required processor in the basic system is an application processor, which executes user programs and user-oriented utilities, such as sorting. Both user programs and utilities are stored in the associated memory during the period of execution. The application processor executes code created from Cobol, RPG, and MPL (Message Processing Language). The memory set with this processor has either 262,144 or 524,288 bytes.

Up to five processors can be assigned to the application processing function. Each of the optional applications processors can have a memory of 262,144 or 524,288 bytes.

The CP 9500 systems provide four types of processors, each of which has its own dedicated memory and operates independently to perform a specific set of functions: an operating system processor, a file management processor, an applications processor, and a data communications processor. Depending on the model, one or more of each type of processor may be configured with the system. Each processor is connected to the system's memory bus so that, when necessary, information exchanges can take place between the processors.

The CP 9500 Series is available in two basic models as follows:

- **CP 9582—includes four 3MHz processors, cabinet, power supply, DCP controller synchronizing card (CSC), two 65K byte memory modules, two 524K-byte memory modules, and an extended backplane. The controller synchronizing card is required for any DCP unless it is attached to a Line Expansion Module. The total memory with a basic system of four processors is approximately 1M bytes.**
- **CP 9585—is exactly the same as the CP 9582 but is capable of supporting a 5¼-inch inbuilt Winchester hard disk.**

Options to the basic CP 9500 configurations consist of processor add-ons, main memory add-ons, peripheral devices, and data communications features.

Additional applications and data communications processors can be added, accompanied by add-on memory modules, up to the maximum number of processors. For the CP 9582/5, memory modules of 65,536 bytes, 262,144 bytes, or 524,288 bytes and disk file cache memory modules of 262,144 or 524,288 bytes are available.

Processor redundancy can be configured for the operating system processor and the file management processor using applications processors and I/O Select Modules. System maximums for the CP 9582/5 are eight processors and 3.4M bytes of main memory. Add-on processors and memory modules ordered after initial system delivery can be installed by a local field engineer.

CONNECTION TO HOST AND PERIPHERALS

CP 9500 systems can be connected to Burroughs or non-Burroughs host computers through data communications lines. The systems do not support high-speed parallel transfer to a host, except through Inter Systems Control (ISC) connection using BNA to Burroughs hosts.

Peripherals for the CP 9500 include an operator console, flexible disk, disk cartridge, fixed disk, disk pack, disk loader, and magnetic tape control options. A line printer and control is also offered. Peripheral options for the CP 9582 include fixed disk, (up to 240M bytes external, 102M bytes internal), disk pack (up to 1.5GB), magnetic tape (up to 160KB per second), card reader (up to 600 cards per minute), and line printer (up to 1,500 lines per minute).

Unassigned I/O channels are available for the attachment of peripherals to the basic system. Model CP 9585 provides up to five. An I/O Expansion Module, available as an option, adds four more I/O channels to any model for the attachment of additional peripherals.

A controller is required for connection of each peripheral unit to the system, and provides the interface between the peripheral and the I/O channel to which it is attached; in the case of the disk options, one disk loader module is also required. All peripherals except the disk/diskette units are interfaced to the operating system processor. The disk

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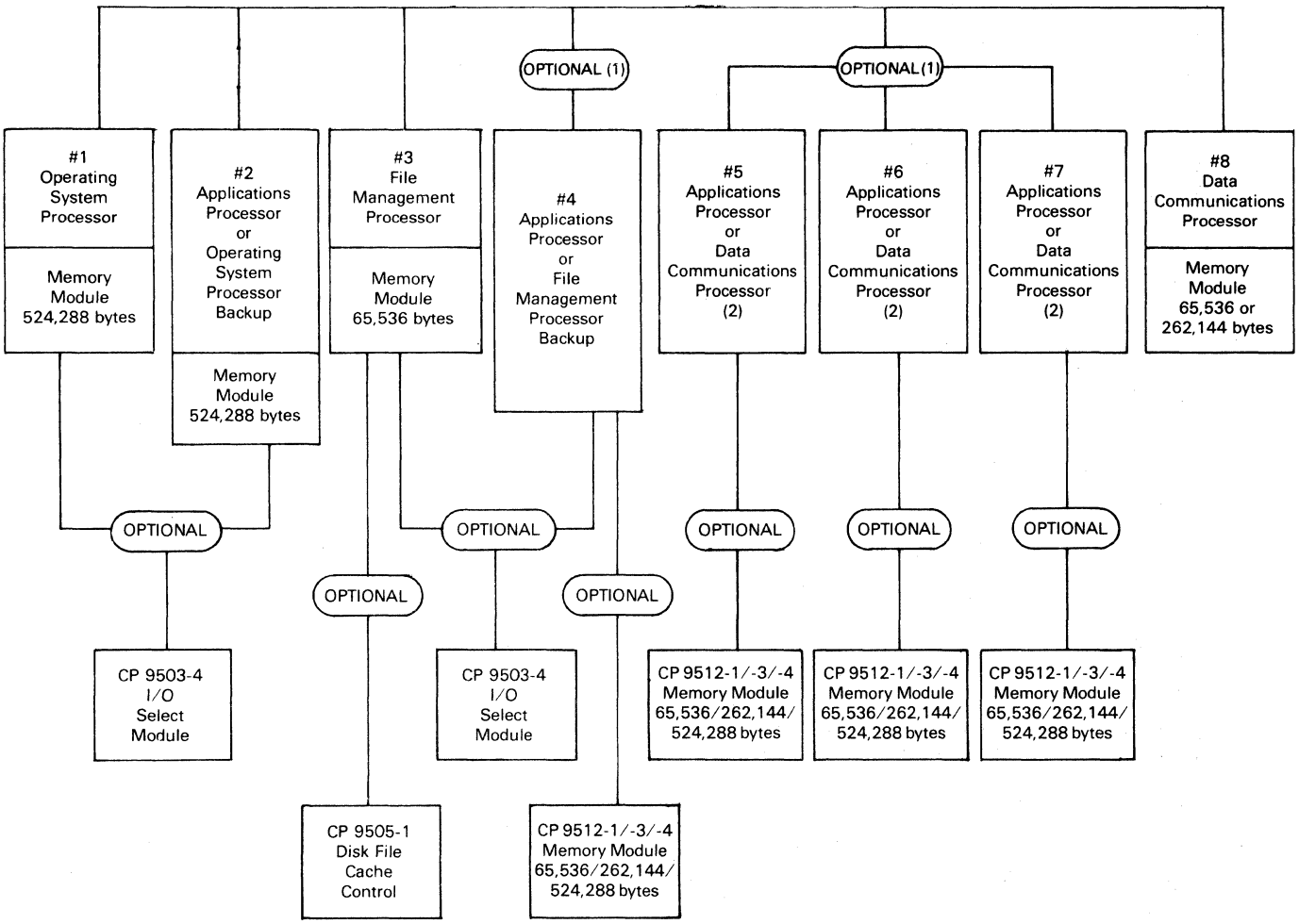
Burroughs CP 9500 Series Communications Processors



Notes:
(1) At least one Applications Processor must be configured per system; the user may select #2, #4, or #5.
(2) The system configuration must include eight processors to allow use of three communications processors.

Figure 1. Schematic of CP9582/5 processor and memory options

The CP 9582/5 also accommodate up to two Input/Output Select Modules (IOSM). The IOSM allows an application processor to serve either as a backup operating system processor or as a backup file management processor; thus separate redundancy can be provided for these functions. The system configuration must include at least five processors (with one backup processor) or six (with both backup processors) to use this feature. The operating system or file management processor and the applications processor with which it is paired must have identical amounts of memory.

The basic CP 9500 system supports up to 30 communications lines. Burroughs' CP 9530 Line Expansion Module, introduced in March 1982, can be used to extend the maximum number of lines to 128. The Line Expansion Module can be connected to two independent CP 9585 systems, enabling communication lines to be switched from one system to another under program control for backup purposes.

Offered with the CP 9500 systems, on an unbundled basis, is a wide range of software products designed for use in an

subsystems are interfaced to the file management processor. The CP 9500 models accommodate up to three disk controls in addition to the loader. Up to nine I/O controls are provided. A removable "cold start" disk is required for system load functions; this disk may also be used for load/dump functions.

The data communications components available as options include line expansion modules and units (LEM and LEU), DCP interface kits, dual host options, and 50- or 25-foot LEU-DCP cables. An LEM is a 30-inch-high free-standing cabinet that contains a line expansion unit (LEU), consisting of a control panel with line indicator lights and an independently powered backplane for up to 16 data communications line adapters. Optionally, an additional LEU with indicator panel, backplane, and power supply for up to 16 additional data communications line adapters can be added to the LEM cabinet.

The maximum number of communications lines that can be configured is 128. Each datacomm processor will support a maximum of 1500 cps aggregate bandpass.

Line printers offered include: the B 9249 Series, which includes 160, 250, and 350 lpm models; the B 9246-3 and -6, which operate at 320 lpm and 650 lpm with a 48-character set and 300 lpm and 600 lpm with a 64-character set,

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on-line transaction-oriented environment, including a full-function operating system, extensive software support for on-line programming and on-line data entry, and RPG, Cobol, and Basic programming language compilers. The operating system consists of two basic modules, the Computer Management System (CMS) and the Computer Management Distributed Information System (CMDIS), both of which are compatible with both the predecessor B 867 and B 877 systems' software, and with Burroughs B 80, B 90, B 900, B 1800, and B 1900 mainframes. Numerous Computer Management program products provide for on-line data entry, on-line file maintenance and inquiry, message handling, system-to-system RJE operations, and other functions. Communications packages are available for Burroughs-standard RJE; IBM 360/20 HASP, 2780/3780, or 3270 emulation; Burroughs Network Architecture (BNA) compatibility (for CP 9585 only); IBM System Network Architecture, (SNA) compatibility (CP 9585 only); and interfacing with public packet-switching networks using the X.25 protocol.

COMPETITIVE POSITION

The Burroughs CP 9500 Series communications processors have limited competition as they are designed to work mainly with Burroughs computers. They can also interface with IBM's SNA and BSC communications networks. Other communications processors are plug-compatible with IBM and compete for that market. Burroughs' aim is to target, encourage, and embrace international and/or industrial standards. When standards have not yet been finalized, their strategy is to implement IBM or SNA protocols.

ADVANTAGES AND RESTRICTIONS

The multiprocessor architecture of Burroughs CP 9500 communications processors allows for various functions to occur simultaneously. The principle of dedicated processors enables users to expand their systems according to current requirements. Since all CP 9500 systems are compatible, users of previous CP 9500 models can acquire the new CP 9585 with reprogramming. Applications made possible by the CP 9582/5 software include distributed user application processing; remote functions such as data entry, report preparation, and on-line programming; message switching; protocol conversion; and network/terminal concentration. The CP 9500 Series has increased memory size over earlier versions and also has a faster MHz cycle than earlier models. The CP 9585 can be interfaced for SNA compatibility and can also interface with public packet-switching networks that use the X.25 protocol.

The CP 9500 Series communications processors, as front-end processors, have no channel connections to non-Burroughs hosts. They can connect through synchronous or asynchronous communications lines. With Burroughs hosts, they use the ISC intersystem control connection.

USER REACTION

Three users of Burroughs' CP 9500 Series communications processor responded to Datapro's 1985 Network User's

respectively; the B 9349-375, B 9246-13, B 9247-14, and B 9247-15 line printers, which print at 375, 1,250, 1,100, and 1,500 lpm, respectively. All models feature 132 print positions per line and operator-changeable print bands, and provide a 12-channel format tape reader as either standard or optional.

Fixed disk drives include: a pair of single-spindle drives that provide 18.8MB capacities; the B 9493-20, -40, and -80, three single-spindle Winchester-type units; and CP 9493-61, -62, and -63 units supporting 1, 2, and 3 inbuilt 5¼-inch disks internally. Each internal disk supports 34MB for a maximum of 102MB.

Dual disk pack drives include: the B 9387-11, a 65.2MB unit with electronic controller; the B 9387-12, a 130.4MB unit with electronic controller; the B 9387-41 disk pack controller; and the B 9484-5, a 130.4MB unit that is used as an add-on drive to the B 9387-12. The electronic controller handles all internal disk functions, such as addressing, sector management, and exchanges between multiple drives. Up to three add-on drives may be accommodated by the B 9387-12's controller. All disk pack drives have direct memory access; average access time is 33 milliseconds. A maximum of 1.7GB disk is supported.

Burroughs offers several of its Super Mini Disk subsystems for use with the CP 9500 Series, including the B 9489-1, an integrated 1MB drive; the B 9489-11 and -12, two free-standing Super Mini Disk models that provide 1MB and 2MB of storage, respectively; and the B 9489-21 and -23, two 6MB units. The B 9489-21 is an integral "cold start" drive; the B 9489-21 is a free-standing unit that can be used only as a "warm-start" auxiliary to the B 9489-21. A 5¼-inch flexible disk is also available.

The operator console used with the CP 9500 Series is a Burroughs ET 1100 display terminal. The ET 1100 is a fully featured editing terminal with a display capacity of 2,000 characters, arranged in 25 rows of 80 characters, and a detachable typewriter keyboard with an optional numeric pad.

TRANSMISSION SPECIFICATIONS

Connection of data communications lines to the data communications processor involves the use of such attachment features as line adapters and connect kits. A line adapter, the Type 2 Line Adapter (there were previous styles), provides either BDLC or non-BDLC interfacing for both modem and direct connections, and allows the system to support a greater number of lines.

The RS-232-C interface supports asynchronous transmission at up to 1800 bps and synchronous transmission at up to 9600 bps; a DDS data service unit can be installed for access to AT&T's Dataphone Digital Service. The BDI interface supports asynchronous transmission at up to 19,200 bps. The TDI interface supports direct connections at a rate of up to 9600 bps for devices located within 1,000 feet of the processor; 38,400 bps for devices located within 250 feet. The BDLC Interface supports synchronous modem connections only, at up to 9600 bps. The CP 9585 adds bit-oriented capability for SDLC and HDLC. A Type 3 Line Adapter performs all of the above over two lines on a single adapter cord.

The connection kits are available for RS-232-C (modem) or TDI (direct) connection, or (for Line Adapter Type 3), or for both.

The data communications processor can also support one auto-call unit interface per line adapter, which permits automatic dialing of that line via a AT&T 801 Automatic Calling Unit.

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Survey; among them, they had 19 installed systems. Their ratings are as follows:

	Excellent	Good	Fair	Poor	WA*
Overall performance	1	2	0	0	3.3
Ease of installation	1	1	0	0	2.7
Ease of operation	1	0	2	0	2.7
Ease of expansion	1	0	2	0	2.7
Hardware reliability	2	0	1	0	3.3
Quality of manufacturer's software/firmware	1	1	0	1	2.7
Ease of programming	1	0	1	1	2.3
Quality of manufacturer's maint. svc./tech. support	1	1	0	1	2.7

*Weighted Average based on a scale of 4.0 for Excellent.

Datapro was unable to contact individual users of Burroughs' CP 9500 Series communications processors for additional comments. □

SOFTWARE

CP 9500 Series systems utilize Burroughs' Computer Management Transaction Control System (CM TCS-1) as their basic operating software. CM TCS-1 is a modular package of control software that provides support for operations in an on-line transaction processing environment. Its two basic elements are the Computer Management System (CMS) and the Computer Management Distributed Information System (CMDIS). Computer Management programs are compatible both with predecessor Burroughs communications processor systems and with current communications processors.

CMS includes: the Master Control Program, a Utilities package, a File Management package, and high-level language compilers.

The Master Control Program (MCP) is the CP 9500 operating system and controls all other system functions. MCP features multiprogramming, multiprocessing, virtual memory, dynamic resource allocation, and I/O control.

The Utilities package provides various system routines to be used for system initialization; program development; and conventional and indexed sequential file sort, file dump, file load, file lists, directory maintenance, and media conversion.

File management capabilities of CMS support sequential, index sequential, and random file organizations directly through the MCP via compilers and utilities. Access to files can be either sequential or random with read, add, update, and delete functions. CMS also features shared file capabilities that give multiple update programs concurrent access to the same file or group of files. The MCP automatically locks and unlocks blocks of records to avoid data corruptions that might occur if simultaneous updating of the same data were permitted. Programs receive up-to-date records even when other programs are adding, changing, or deleting records in the same file. The shared files feature is supported by Cobol, RPG, and MPL and applies to both indexed and sequential files.

The use of high-level languages on Burroughs CMS systems is the key to the portability of applications programs between CMS equipment. All CMS systems support the same compilers to generate common executable object code. Languages supported include On-board Cobol, On-board Report Program Generator (RPG), On-board Network Definition Language (NDL), On-board Message Processing Language II (MPL II), and Basic.

NDL is a parameterized user-oriented language used to describe the system's data communications environment. NDL statements define the lines, modems, terminals, line speeds, character translation, etc. Using these statements, the NDL compiler generates the code and tables required for the Network Control Program. NDL is designed to simplify the implementation of data communications networks and to allow changes in the network to be made quickly and easily.

MPL II is the language that generates Message Control Systems (MCS) programs. These programs are used to process, edit, collect, verify, route, and audit messages in a data communications network. The MPL II language is made up of parameterized user-oriented statements that permit users to customize the MCS programs to meet specific requirements of their networks. User programs may also be written in MPL II.

CMDIS software provides CP Series systems with programs for distributed processing and communications applications. These include program-to-program communication between computer systems, expanded capacity for distributed on-line data entry operations, and interfaces to central host computers, to packet-switching services, and other computer network architectures.

Additions to the CMDIS software for the CP 9582/5 include the SNA RJE and 3270 Pass-thru. The SNA RJE interface program allows a CP 9582/5 to perform remote job entry functions in an SNA environment. RJE control statements and job streams are prepared at the remote CP 9582/5 site and transmitted to the IBM host system for processing. After the job is processed by the host, the resulting "print" or "punch" output is transmitted back to the CP 9582/5 where it can be printed or written on disk for remote processing. The SNA RJE program can communicate with IBM batch applications running under JES2, JES3, RES, or POWER job entry subsystems.

The SNA Passthrough interface program allows applications programs or 3270 terminals on a CP 9582/5 system to communicate interactively with message processing programs executing under any application subsystem on an IBM SNA host.

CMDIS also includes the Generalized Message Control System (GEMCOS); Burroughs Networking Facilities; IBM Network Interface Facilities, providing capabilities in addition to the SNA interface programs; Public Data Network Facilities; Program Development Aids; and other software.

GEMCOS provides a link between the communications network and application programs. It enables messages to be processed before being directed to application programs, thus eliminating repetitive coding in application programs and providing additional flexibility for line and terminal use. GEMCOS incorporates security and audit trails, transaction routing, alternate routing, and message formatting.

Burroughs Networking Facilities include Burroughs Network Architecture (BNA), Burroughs System Communication Module (SYCOM), and Burroughs Remote Job Entry (RJE). These programs aid the interfacing of CP 9500 systems in networks with other Burroughs products.

Burroughs software packages providing IBM Network Interface Facilities include the IBM HASP Remote Job Entry Interface Program, IBM 2780/3780 Look-Alike Remote Terminal Program Interface, and IBM 3270 Line Protocol Remote Terminal Program Interface.

Burroughs' Public Data Network Facilities X.25 interface program allows CP 9500 systems running local user pro-

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Burroughs CP 9500 Series Communications Processors

grams to communicate with application programs or packet mode terminals residing in other systems via public data networks that conform with the CCITT X.25 standard. The X.25 interface program performs virtual calls, directs virtual circuit procedures, disassembles messages into packets, and assembles the packets into messages. The physical interface connects full-duplex lines transmitting at speeds up to 9600 bps. The bit-oriented procedures provided through NDL conform to the HDLC standards for link access as specified by the X.25 standard.

The Program Development Aids include the Command and Edit Language (CANDE) On-Line Programming, On-Line Reporter, and Direct On-Line Maintenance and Inquiry System (DOMAIN). CANDE provides on-line programming facilities for Cobol, MPL II, NDL, and RPG II programmers; this interactive system enables the user to create and update source and data files. The On-Line Reporter simplifies the generation of customized reports. DOMAIN is a program that provides a method for quickly developing file maintenance and inquiry programs in on-line terminal installations. DOMAIN does not require user knowledge of any programming language. It can be used to create, add, delete, and maintain records in a disk file, as well as inquire into records in a disk file.

Other Burroughs software includes the On-Line Data Entry System (ODESY). ODESY is a data entry and verification system that supports up to 16 Burroughs display terminals.

PRICING

The CP 9500 systems are available for purchase or on a one-, three-, or five-year lease. Lease prices include 24 hour, 7-days-a-week maintenance. The software is licensed and priced separately. Detailed pricing information on the CP 9500 Series models can be obtained from the vendor. ■

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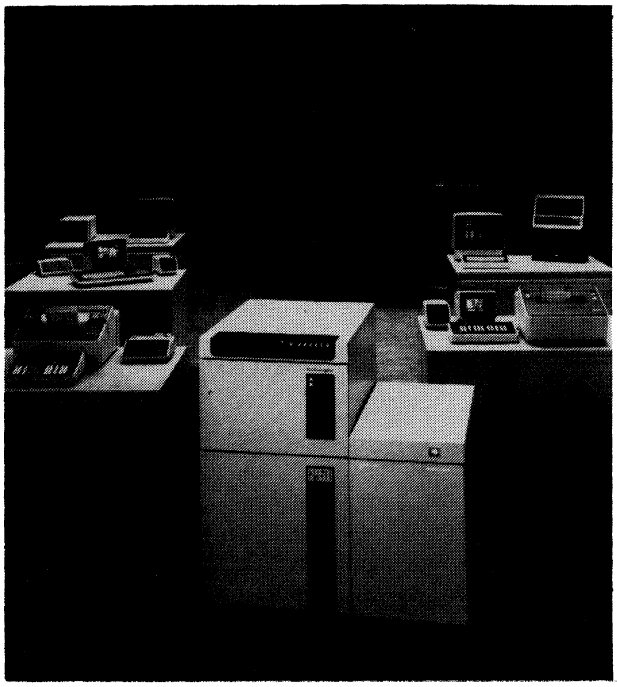
Burroughs CP 9400 and CP 9500 Series Communications Processors



Burroughs CP 9582 communications processor system (foreground center), shown here with various related Burroughs terminals, serves as a financial controller system, manufacturing data collection system, and general purpose terminal control and distributed processing system. The CP 9582 performs line protocols, message handling, and screen formatting functions for the terminals. It then passes the edited transactions to a Burroughs or non-Burroughs computer for processing.

Communications processing systems that interlink remote data processing operations and local networks of terminals with each other and with central computers to form data communications networks of various sizes.

The CP 9400 and CP 9500 Series communicate with Burroughs and non-Burroughs computers and terminals over switched or leased lines and through packet-switching networks. The CP Series processors can also function as hosts in distributed processing networks.

The top-of-the-line CP 9582 communications processor includes four to eight 3MHz microprocessors and a maximum main memory of 3.4M bytes. Up to 18 data communications lines can be installed in the CP 9582 cabinet; and with CP 9530 Line Expansion Modules, a maximum of 59 lines can be supported.

The CP 9582 effectively supersedes all other CP 9400 and CP 9500 Series models. However, the CP 9452, CP 9471, CP 9472, CP 9558-1, and CP 9572 are still actively marketed. We expect that Burroughs gradually will phase out these older, less powerful systems.

Purchase prices of the CP 9582 range from $27,000 to $44,000 for the basic system. Lease prices for the basic system begin at $900 per month for a five-year lease and go up to $1,125 per month for a one-year lease.

MANAGEMENT SUMMARY

Introduced in 1980, the original members of the CP 9400 and CP 9500 Series superseded the earlier B 870, B 860, and B 770 Series communications processors. The CP Series can interlink remote data processing operations and local terminal networks with each other and with central computers (Burroughs or non-Burroughs), and can also serve as hosts in distributed processing networks.

The newest member of the Burroughs CP 9500 family, the CP 9582 communications processor system, was announced in June 1982. The CP 9582 supersedes all other models in the CP 9400 and 9500 Series, although the CP 9452, CP 9471, CP 9472, CP 9558-1, and CP 9572 are still actively marketed and are expected to be phased out gradually.

The CP 9582 employs multiprocessor architecture that has characterized the entire CP 9500 Series models, and accommodates four to eight microprocessors. All processors in the system are Burroughs' newly designed Basic Data System (BDS) microprocessors, which operate concurrently at 3MHz. Each processor operates in a semi-autonomous manner, executing instructions from its own memory module and performing a specific function.

CHARACTERISTICS

VENDOR: Burroughs Corporation, Burroughs Place, Detroit, MI 48232. Telephone (313) 972-7000.

DATE OF ANNOUNCEMENT: CP 9400 and CP 9500 Series—March 1980; Models CP 9558 and CP 9572—August 1980; CP 9558-1—February 1982; CP 9582—June 1982.

DATE OF FIRST DELIVERY: CP 9400 Series—January 1980; CP 9500 Series—May 1980; Models CP 9558 and CP 9572—fourth quarter 1980; CP 9558-1—first quarter 1982; CP 9582—June 1982.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: Burroughs Corporation.

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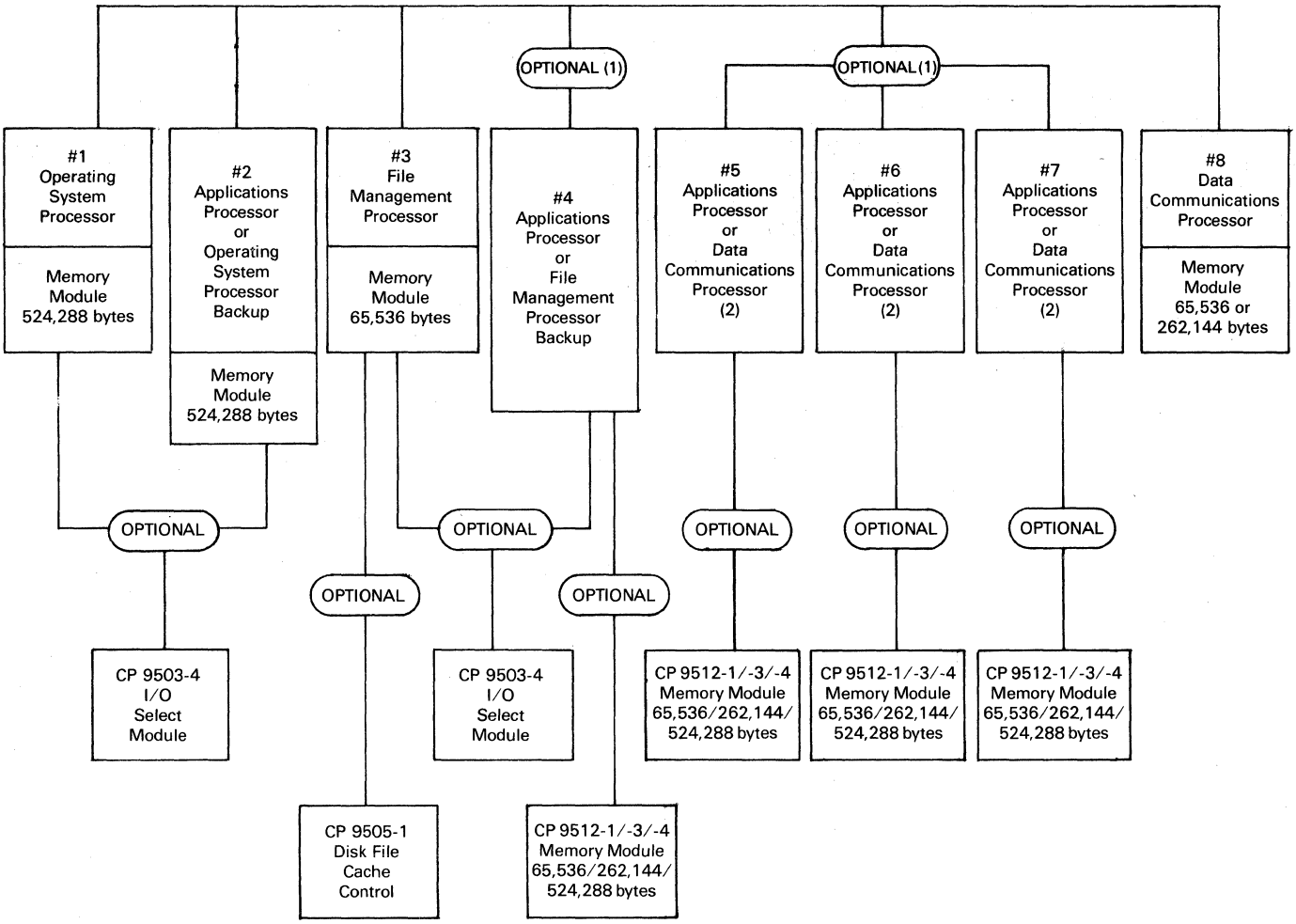
Burroughs CP 9400 and CP 9500 Series Communications Processors



Notes:
(1) At least one Applications Processor must be configured per system; the user may select #2, #4, or #5.
(2) The system configuration must include eight processors to allow use of three communications processors.

Figure 1. Schematic of CP 9582 processor and memory options

Four processors are required in the basic system configuration. One processor (Processor #1 in Figure 1) is responsible for executing the Master Control Program (MCP), the operating system that directs the activities of the CP 9582 system. This processor/memory set houses and executes all the microcoded control routines associated with the MCP except for disk functions. It also provides data storage buffers as needed for I/O devices attached to the system. The operating system processor is interrupted by the other processors as MCP services are required, and it interrupts the other processors for passage of control information. This processor controls the system's time-of-day clock, the operator display terminal, and other non-disk peripherals. The memory set with this processor contains 524,288 bytes.

The second processor (Processor #3 in Figure 1) provides direct interfacing to attached disk device(s). This file management processor/memory set houses and executes the logical and physical disk I/O functions. The memory module with this processor contains 65,536 bytes for

CONFIGURATION

CP 9400 SERIES

The CP 9400 Series Communications Processor Systems provide two processors: a data communications processor (DCP) and a main processor that handles all other system functions. The DCP operates independently to offload the main processor from data communications tasks, provide a first level of error detection and correction, and provide interfaces for devices communicating with the main processor. The main processor provides the main memory subsystem for all operating system and applications program code. The DCP provides a separate memory of 8K words in which data communications routines are housed and executed.

The 9400 Series is available in three basic models as follows:

- **CP 9452—includes a 2 MHz main processor with 96K bytes of main memory, cabinet, power supply, and realtime clock; a Burroughs Model TD 831 display terminal with keyboard for use as an operator console; a display control; an integral 1MB diskette drive; an 18.8MB fixed disk drive; a DCP that supports up to 7**

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Burroughs CP 9400 and CP 9500 Series Communications Processors

storage of its functions. An additional 16K bytes of Read Only Memory (ROM) attached to the processor includes logic to provide system load functions. The ROM also provides the logical capability to perform diagnostic testing automatically each time the basic system load functions are performed. A disk file cache module, including 262,144 or 524,288 bytes of memory, can optionally be installed with the file management processor. By storing frequently used data in its fast-access memory, the disk file cache module can reduce file access time.

The third processor (Processor #8 in Figure 1) provides a direct interface to data communications lines attached to the system. The data communications processor/memory set houses and executes the network handling code generated to user specifications by Burroughs Network Definition Language. Other functions performed by the data communications processor (DCP) include establishment of line protocol for attached terminal devices and first level error recovery. The memory module with this processor contains 65,536 bytes for storing its functions. It is possible to use the data communications processor for applications processing when data communications processing is terminated. In that case, the DCP must have the 262,144 byte memory module.

Of the eight processors that the CP 9582 system can accommodate, up to four processors can be used as data communication processors. Each of the optional DCPs can be configured with 65,536 bytes, providing a potential maximum of 262,144 bytes of memory for data communications functions.

The fourth required processor in the basic system is an application processor, which executes user programs and user-oriented utilities, such as sorting. Both user programs and utilities are stored in the associated memory during the period of execution. The application processor executes code created from Cobol, RPG, and MPL (Message Processing Language). The memory set with this processor has either 262,144 or 524,288 bytes.

Up to five processors can be assigned to the application processing function. Each of the optional applications processors can have a memory of 262,144 or 524,288 bytes.

The CP 9582 also accommodates up to two Input/Output Select Modules (IOSM). The IOSM allows an application processor to serve either as a backup operating system processor or as a backup file management processor; thus separate redundancy can be provided for these functions. The system configuration must include at least five processors (with one backup processor) or six (with both backup processors) to use this feature. The operating system or file management processor and the applications processor with which it is paired must have identical amounts of memory.

The principle of dedicated processors enables users to expand their systems according to current requirements.

half or full duplex data communications lines; a 7-line base and expander; two TDI/modem line adapters; and two direct connect kits. The diskette and disk drives are controlled by a Universal Disk Control and Disk Exchange, which also provide control logic for two additional optional fixed disk, cartridge disk, or diskette drives. A printer/keyboard console may optionally be substituted for the display/keyboard console for the difference in price.

- **CP 9471—similar in configuration to the CP 9452 except that it provides 114K bytes of main memory instead of 96K, has a free-standing 1MB diskette drive instead of an integral 1MB drive, provides a DCP that supports up to 16 half or full duplex lines instead of 7, and comes with a 4-line base and expander.**

- **CP 9472—identical in configuration to the CP 9471 except for its disk components. Instead of an 18.8MB fixed disk drive, the Universal Disk Control, and the Disk Exchange, the CP 9472 provides flexible disk control, a 130.4MB dual disk drive with an electronic controller that supports three additional disk packs, and a disk pack control. The free-standing 1MB diskette unit provided on the CP 9471 is also included as a standard feature on the CP 9472, but is controlled by a dedicated diskette control.**

Options to the basic CP 9400 configurations are of three types: main memory add-ons, peripheral devices, and data communications features.

Peripherals available for the CP 9400 Series include 80-column card readers; a 45-cpm card punch; several models of line printers, ranging in speed from 85 to 750 lines per minute; a choice of two 9-track magnetic tape units; a choice of three tape cassette units; and a variety of fixed disk, cartridge disk, and diskette units.

Unassigned I/O channels are available for the attachment of peripherals to the basic system. Model CP 9452 provides up to three additional I/O channels; and Models CP 9471 and CP 9472, up to four additional I/O channels. An I/O Expansion Module, available as an option for the CP 9471 and CP 9472 only, adds four more I/O channels to the system for attachment of additional peripherals, for a total system maximum of eight channels. Generally, one I/O channel is used for each I/O device control and, generally, each I/O device control can support one peripheral unit. Exceptions are that the CP 9425-5 magnetic tape control requires two I/O channels, and that most of the disk controls support multiple drives. Any combination of peripherals is acceptable; each peripheral may be of a different type, or multiple devices of the same type may be added. The maximum amount of removable disk storage configurable is 520MB.

Each system's DCP provides for the addition of optional data communications features to supplement the ones provided with the basic system. Each basic system includes a complete set of attachment features for two data communications lines as standard. On the CP 9452, attachment features for five additional lines can optionally be added, providing for a total system maximum of seven data communications lines. On the CP 9471 and CP 9472 (which are identical in their data communication capabilities and configuration), attachment features for 14 additional lines can optionally be supported by the basic system's DCP. If more than 16 lines are required, a second DCP can be added to the CP 9471 or CP 9472: if the optional I/O Expansion Module has been installed on the system, this second DCP can support up to four additional lines, for a total system maximum of 20 lines; if the I/O Expansion Module is not installed, the second DCP can support up to 16 additional lines, for a total system maximum of 32 lines.

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Burroughs CP 9400 and CP 9500 Series Communications Processors

Since all CP 9500 systems are compatible, users of previous CP 9500 models can acquire the new CP 9582 without reprogramming. Applications made possible by the CP 9582 software include distributed user application processing; remote functions such as data entry, report preparation, and on-line programming; message switching; protocol conversion; and network/terminal concentration.

The basic CP 9582 supports up to 18 communications lines. Burroughs' CP 9530 Line Expansion Module, introduced in March 1982, can be used to extend the maximum number of lines to 59. The Line Expansion Module can be connected to two independent CP 9582 systems, enabling communication lines to be switched from one system to another under program control for backup purposes.

Five older CP 9400 and CP 9500 Series Models are also actively marketed by Burroughs. In comparison to the CP 9582, these models utilize less powerful microprocessors, have smaller maximum memories, support fewer communications lines, and lack the ability to interface with IBM SNA systems.

The CP 9452, 9471, and 9472 basic systems each include two microprocessors. The CP 9452 has 96K bytes of memory; the CP 9471 and 9472 each have 114K bytes. The CP 9452 supports seven data communications lines. The CP 9471 and 9472 each support 16 lines. The CP 9471 and 9472 are distinguished only by the type of disk storage each provides. The CP 9558-1 is a pre-configured system based on the previously available CP 9558. The basic 9558-1 system includes four microprocessors and memory totaling 622.5K bytes. A maximum configuration includes six microprocessors and 1M bytes of memory.

The CP 9572 basic system includes five microprocessors with memory totaling 622.5K bytes. A maximum system includes eight microprocessors and 1.5M bytes of memory. As with the 9582, the I/O Select Module provides for backup of the operating system processor and file management processor through pairing with an adjacent applications processor.

With the Burroughs Line Expansion Module the maximum number of data communications lines supported by the CP 9558-1 is 32 lines and the maximum number of data communications lines supported by the CP 9572 is 47 lines.

Offered with all CP 9400 and CP 9500 systems, on an unbundled basis, is a wide range of software products designed for use in an on-line transaction-oriented environment, including a full-function operating system, extensive software support for on-line programming and on-line data entry, and RPG and Cobol programming language compilers. The operating system consists of two basic modules, the Computer Management System (CMS) and the Computer Management Distributed

CP 9500 SERIES

The CP 9500 Series Communications Processor Systems are built on a multiprogramming and multiprocessing architecture similar to that utilized by Burroughs for their B 900 Series of computers. The systems are designed as small compact units and provide high-density disk storage with printer back-up. They can be controlled either locally by a directly attached dedicated console, or remotely using any TD 831 or MT 983 display/keyboard for the 9558-1 and 9572, or TD 850 or MT 983 for the 9582. Two line printers, three fixed disk drives, and a 6MB diskette subsystem were introduced with the CP 9500 Series.

The CP 9500 systems provide four types of processors, each of which has its own dedicated memory and operates independently to perform a specific set of functions: an operating system processor, a file management processor, an applications processor, and a data communications processor. Depending on the model, one or more of each type of processor may be configured with the system. Each processor is connected to the system's memory bus so that, when necessary, information exchanges can take place between the processors.

The CP 9500 Series is available in three basic models as follows:

- **CP 9558-1—is a preconfigured system based on the now defunct CP 9558. It includes four 2 MHz processors, cabinet, power supply, real-time clock, disk drives, disk controls, disk loader, line adapter, and direct connect kit. The operating system processor and the applications processor each provide 262K bytes of main memory; the data communications processor, 65K bytes; and the file management processor, 32K bytes. Total main memory is 622.5K bytes in the basic system.**
- **CP 9572—includes four 2 MHz processors, cabinet, power supply, and real-time clock. The basic system's processors are identical to those of the CP 9558-1, and total main memory capacity for the basic system is 622.5K.**
- **CP 9582—includes four 3 MHz processors, cabinet, power supply, DCP controller synchronizing card (CSC), two 65K byte memory modules, two 524K byte memory modules, and an extended backplane. The controller synchronizing card is required for any DCP unless it is attached to a Line Expansion Module. The total memory with a basic system of four processors is approximately 1M bytes.**

Options to the basic CP 9500 configurations consist of processor add-ons, main memory add-ons, peripheral devices, and data communications features.

Additional applications and data communications processors can be added, accompanied by add-on memory modules, up to the maximum number of processors for each model. For the CP 9558-1 or CP 9572, memory modules of 65,536 bytes or 131,072 bytes or a disk file cache memory module of 262,144 bytes can be added. For the CP 9582, memory modules of 65,536 bytes, 262,144 bytes, or 524,288 bytes and disk file cache memory modules of 262,144 or 524,288 bytes are available.

Processor redundancy can be configured for the operating system processor and the file management processor using applications processors and I/O Select Modules. This capability is supported for the CP 9572 and CP 9582 only. System maximums are six processors and 1.2M bytes of main memory for the CP 9558-1, eight processors and 1.5M bytes of main memory for the CP 9572, and eight processors and 3.4M bytes of main memory for the CP 9582. Add-on processors and memory modules ordered after initial system delivery can be installed by a local field engineer.

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Burroughs CP 9400 and CP 9500 Series Communications Processors

Information System (CMDIS), which are compatible with both the predecessor B 867 and B 877 systems' software, and with Burroughs B 80, B 90, B 900, B 1800, and B 1900 mainframes. Numerous Computer Management program products provide for on-line data entry, on-line file maintenance and inquiry, message handling, system-to-system RJE operations, and other functions. Communications packages are available for Burroughs-standard RJE; IBM 360/20 HASP, 2780/3780, or 3270 emulation; Burroughs Network Architecture (BNA) compatibility (for CP 9500 only); IBM System Network Architecture (SNA) compatibility (CP 9582 only); and interfacing with public packet-switching networks using the X.25 protocol.□

Peripherals for the CP 9558-1 and 9572 include an operator console, flexible disk, disk cartridge, fixed disk, disk pack, disk loader, and magnetic tape control options. A line printer and control is offered for the CP 9572 but not the CP 9558-1. Peripheral options for the CP 9582 include fixed disk, (up to 240M bytes), disk pack (up to 520M bytes), magnetic tape (up to 160KB per second); card reader (up to 600 cards per minute), and line printer (up to 1500 lines per minute). New peripherals available with the CP 9582 are the B 9387-41 disk controller, B 9494-41 data banks, B 9115/16 card readers (300/600 cpm), B 9247-13 train printer (1100 lpm), B 9247-15 train printer (1500 lpm), and B 9246-13 band printer (1250 lpm).

Unassigned I/O channels are available for the attachment of peripherals to the basic system. Models CP 9558-1 and 9572 provide up to four unassigned I/O channels. Model CP 9582 provides up to five. An I/O Expansion Module, available as an option, adds four more I/O channels to any model for the attachment of additional peripherals, for a total system maximum of eight channels (CP 9558-1 and 9572) or nine channels (CP 9582).

A controller is required for connection of each peripheral unit to the system, and provides the interface between the peripheral and the I/O channel to which it is attached; in the case of the disk options, one disk loader module is also required. All peripherals except the disk/diskette units are interfaced to the operating system processor. The disk subsystems are interfaced to the file management processor. The CP 9500 models accommodate up to two or three disk controls in addition to the loader. Up to nine I/O controls are provided. A removable "cold start" disk is required for system load functions. This disk may also be used for load/dump functions.

The data communications components available as options include line expansion modules and units (LEM and LEU), DCP interface kits, dual host options, and 50- or 25-foot LEU-DCP cables. An LEM is a 30-inch-high free-standing cabinet that contains a line expansion unit (LEU), consisting of a control panel with line indicator lights and an independently-powered backplane for up to twelve data communications line adapters. Optionally, an additonal LEU with indicator panel, backplane, and power supply for up to twelve additional data communications line adapters can be added to the LEM cabinet.

The maximum number of communications lines that can be configured is 32 for the CP 9558-1, 47 for the CP 9572, and 59 for the CP 9582. The maximum number of lines remains the same whether additional data communications processors are configured or not.

CONNECTION TO HOST COMPUTER: CP 9400 and CP 9500 systems can be connected to Burroughs or non-Burroughs host computers through data communications lines. The systems do not support high speed parallel transfer to a host.

TRANSMISSION SPECIFICATIONS

CP 9400 SERIES

Connection of data communications lines to the DCP involves the use of four types of attachment features: line bases, line expanders, line adapters, and connect kits.

One line base and one line expander are provided as standard on each basic system. On the CP 9452, the standard line base/expander pair can handle up to seven lines; since this is the maximum number of lines for the system, no additional base/expander pairs can be added. On the CP 9471 and CP 9472, three additional line base/expander pairs can be added to the first DCP, in addition to the standard pair; each pair can handle up to four lines. If a second DCP has been installed, one line base/expander pair must be added for each set of four lines to be attached. Depending on the line base selected, half duplex only, or half and full duplex transmission can be supported.

The specific type of interfacing required by each line being connected is provided by line adapters. One line adapter is needed per line. One style of line adapter provides an RS-232-C-compatible modem interface, a Burroughs-compatible two-wire direct interface (TDI), or a Burroughs direct interface (BDI). The other style provides a Burroughs Data Link Control (BDLC) interface.

The RS-232-C interface supports asynchronous transmission at up to 1800 bps and synchronous transmission at up to 9600 bps; a DDS data service unit can be installed for access to AT&T's Dataphone Digital Service. The TDI interface supports asynchronous transmission at up to 9600 bps; and the BDI interface, up to 19,200 bps. The BDLC interface requires two line adapter slots in the DCP and supports synchronous modem connection only, at up to 9600 bps.

The connection kits provide the connections that physically attach the lines to the line adapters. Kits are available for RS-232-C (modem) or TDI/BDI (direct) connection.

On the CP 9471 and CP 9472 only, the DCP can support one dual-line auto-call unit interface, which permits automatic dialing of two data communications lines via a Bell 801A Automatic Calling Unit.

Line types may be attached in any combination, as long as the DCP's aggregate throughput maximum is not exceeded. Throughput limits depend on the operating mode of the DCP. When operating in "interpretive" mode, the DCP memory is used to store the Network Definition Language (NDL) interpreter, and NDL program code, which is stored in the main system memory, is translated into object code and executed instruction-by-instruction by the DCP as the program runs; when operating in "non-interpretive" mode, NDL programs are compiled and stored in microcode for later execution by the DCP. In "interpretive" mode, the DCP can handle an aggregate throughput of up to 19,200 bps; in "non-interpretive" mode, the aggregate maximum throughput is increased to 56,000 bps.

CP 9500 SERIES

Connection of data communications lines to the data communications processor involves the use of such attachment features as line adapters and connect kits. The Type 1 Line Adapter provides interfacing for an RS-232-C modem connection, a Burroughs direct interface (BDI), or a Burroughs-compatible two-wire direct interface (TDI). The second style provides a Burroughs Data Link Control

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(BDLC) interface. A third line adapter, the Type 2 Line Adapter, can be used only on systems that include neither of the other two adapters. It provides either BDLC or non-BDLC interfacing for both modem and direct connections, and allows the system to support a greater number of lines.

The RS-232-C interface supports asynchronous transmission at up to 1800 bps and synchronous transmission at up to 9600 bps; a DDS data service unit can be installed for access to AT&T's Dataphone Digital Service. The BDI interface supports asynchronous transmission at up to 19,200 bps. The TDI interface supports direct connections at a rate of up to 9600 bps for devices located within 1000 feet of the processor; 19,200 bps for devices located within 250 feet. The BDLC Interface (which, unlike the CP 9400's BDLC interface, occupies just one processor slot) supports synchronous modem connection only, at up to 9600 bps. The CP 9582 adds bit-oriented capability for SDLC and HDLC.

The connection kits are available for RS-232-C (modem) or TDI (direct) connection.

The data communications processor can also support one auto-call unit interface per line adapter, which permits automatic dialing of that line via a Bell 801 Automatic Calling Unit.

SOFTWARE

CP 9400 and CP 9500 systems utilize Burroughs' Computer Management Transaction Control System (CM TCS-1) as their basic operating software. CM TCS-1 is a modular package of control software that provides support for operations in an on-line transaction processing environment. Its two basic elements are the Computer Management System (CMS) and the Computer Management Distributed Information System (CMDIS). Computer Management programs are compatible both with predecessor Burroughs communications processor systems, and with Burroughs B 80/B 90/B 900/B 1800/B 1900 mainframes. For example, existing CMS programs running on a B 870/B 860/B 771 communications processor may be transferred to a CP 9400 system without recompilation; transfer to a CP 9500 system simply requires recompilation of the NDL programs. Recompilation of the NDL programs is also required to assure compatibility with the mainframe systems.

CMS includes: the Master Control Program, a Utilities package, a File Management package, and high-level language compilers.

The Master Control Program (MCP) is the CP 9400 and CP 9500 operating system and controls all other system functions. MCP features multiprogramming, multi-processing (CP 9500 version only), virtual memory, dynamic resource allocation, and I/O control.

The Utilities package provides various system routines to be used for system initialization; program development; conventional and indexed sequential file sort, file dump, file load, file lists, directory maintenance, and media conversion.

File management capabilities of CMS support sequential, index sequential, and random file organizations directly through the MCP via compilers and utilities. Access to files can be either sequential or random with read, add, update, and delete functions. CMS also features shared file capabilities that give multiple update programs concurrent access to the same file or group of files. Two or more programs can update one file; at the same time, the file can be accessed by multiple inquiry programs. The MCP automatically locks and unlocks blocks of records to avoid data corruption that might occur if simultaneous updating of the same data were permitted. Programs receive up-to-date records even when other programs are adding, changing, or deleting records in the same file. The shared files feature is supported by Cobol, RPG, and MPL and applies to both indexed and sequential files.

The use of high level languages on Burroughs CMS systems is the key to the portability of applications programs between CMS equipment. All CMS systems support the same compilers to generate common executable object code. Languages supported include On-board Cobol, On-board Report Program Generator (RPG), On-board Network Definition Language (NDL), and On-board Message Processing Language II (MPL II).

NDL is a parameterized user-oriented language used to describe the system's data communications environment. NDL statements define the lines, modems, terminals, line speeds, character translation, etc. Using these statements, the NDL compiler generates the code and tables required for the Network Control Program. NDL is designated to simplify the implementation of data communications networks and to allow changes in the network to be made quickly and easily.

MPL II is the language that generates Message Control Systems (MCS) programs. These programs are used to process, edit, collect, verify, route, and audit messages in a data communications network. The MPL II language is made up of parameterized user-oriented statements that permit users to customize the MCS programs to meet specific requirements of their networks.

CMDIS software provides CP Series systems with programs for distributed processing and communications applications. These include program-to-program communication between computer systems, expanded capacity for distributed on-line data entry operations, and interfaces to central host computers, to packet-switching services, and other computer network architectures.

New additions to the CMDIS software for the CP 9582 include the SNA RJE and SNA IMS software packages for interfacing to IBM SNA network systems. The SNA RJE interface program allows a CP 9582 to perform remote job entry functions in an SNA environment. RJE control statements and job streams are prepared at the remote CP 9582 site and transmitted to the IBM host system for processing. After the job is processed by the host, the resulting "print" or "punch" output is transmitted back to the CP 9582 where it can be printed or written on disk for remote processing. The SNA RJE program can communicate with IBM batch applications running under JES2, JES3, RES, or POWER job entry subsystems.

The SNA IMS interface programs allow applications programs or terminals on a CP 9582 system to communicate interactively with message processing programs executing under the Information Management System (IMS) application subsystem on an IBM SNA host.

CMDIS also includes the Generalized Message Control System (GEMCOS); Burroughs Networking Facilities; IBM Network Interface Facilities, providing capabilities in addition to the SNA RJE and SNA IMS interface programs; Public Data Network Facilities; Program Development Aids; and other software.

GEMCOS provides a link between the communications network and application programs. It enables messages to be processed before being directed to application programs, thus eliminating repetitive coding in application programs and providing additional flexibility for line and terminal use. GEMCOS incorporates security and audit trails, transaction routing, alternate routing, and message formatting.

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Burroughs Networking Facilities are offered for CP 9500 systems only, and include Burroughs Network Architecture (BNA), Burroughs System Communication Module (SYCOM), and Burroughs Remote Job Entry (RJE). These programs aid the interfacing of CP 9500 systems in networks with other Burroughs products.

Burroughs software packages providing IBM Network Interface Facilities include the IBM HASP Remote Job Entry Interface Program, IBM 2780/3780 Look-Alike Remote Terminal Program Interface, and IBM 3270 Line Protocol Remote Terminal Program Interface.

Burroughs' Public Data Network Facilities X.25 interface program allows CP 9400 and 9500 systems running local user programs to communicate with application programs or packet mode terminals residing in other systems via public data networks that conform with the CCITT X.25 standard. The X.25 interface program performs virtual calls, directs virtual circuit procedures, disassembles messages into packets, and assembles the packets into messages. The physical interface connects full duplex lines transmitting at speeds up to 9600 bps. The bit-oriented procedures provided through NDL conform to the HDLC standards for link access as specified by the X.25 standard.

The Program Development Aids include the Command and Edit Language (CANDE) On-Line Programming, On-Line Reporter, and Direct On-Line Maintenance and Inquiry System (DOMAIN). CANDE provides on-line programming facilities for Cobol, MPL II, NDL, and RPG II programmers; this interactive system enables the user to create and update source and data files. The On-Line Reporter simplifies the generation of customized reports. DOMAIN is a program that provides a method for quickly developing file maintenance and inquiry programs in on-line terminal installations. DOMAIN does not require user knowledge of any programming language. It can be used to create, add, delete, and maintain records in a disk file, as well as inquire into records in a disk file.

Other Burroughs software includes the On-Line Data Entry System (ODESY) and Remote Supervisory Control (RSC). ODESY is a data entry and verification system that supports up to 16 Burroughs TD 830 display terminals. RSC provides an alternative to the use of a dedicated, directly attached operator display terminal for system control. RSC allows a TD 830 or MT 985, connected by means of the data communications processor, to be used for system control. The terminal can be attached through a direct-connect or modem-connect facility.

PERIPHERALS

Line printers offered include: the B 9249 Series, which includes 85, 160, 250, and 350 lpm models; the B 9246-3 and -6, which operate at 320 lpm and 650 lpm with a 48-character set and 300 lpm and 600 lpm with a 64-character set, respectively; and the B 9247-16, an older 750 lpm unit available for use with the CP 9400 Series only. Additional printers available for the CP 9582 include the B 9349-375, B 9246-13, B 9247-14, and B 9247-15 line printers, which print at 375, 1250, 1100, and 1500 lpm, repectively; and the B 9251, a 230-cps tabletop matrix printer. All models feature 132 print positions per line and operator-changeable print bands, and provide a 12-channel format tape reader as either standard or optional.

Fixed disk drives include: the B 9493-9 and -18, a pair of single-spindle drives that provide 9.4MB and 18.8MB capacities, respectively; the B 9493-28 and -37, dual-spindle versions of the B9493-9/-18 with double the data storage capacities; and the B 9493-20, -40, and -80, three single-spindle Winchester-type units released with and available for use only on the CP 9500 Series that provide 19.3MB, 38.7MB, and 77.4MB of storage respectively. All fixed disk models feature an average access time, including head movement and rotational delay, of 55 milliseconds.

Three models of cartridge disk units are offered: the B 9480-12, which features 4.6MB of storage and an average access time of 80 milliseconds; the B 9480-22, which has 4.6MB of storage and an average access time of 145 milliseconds; and the B 9481-12, which provides a 9.2MB storage capacity and a 100 millisecond access time.

Dual disk pack drives include: the B 9387-11, a 65.2MB unit with electronic controller; the B 9387-12, a 130.4MB unit with electronic controller; the B 9387-41 disk pack controller; and the B 9484-5, a 130.4MB unit that is used as an add-on drive to the B 9387-12. The electronic controller handles all internal disk functions, such as addressing, sector management, and exchanges between multiple drives. Up to three add-on drives may be accommodated by the B9387-12's controller. All disk pack drives have direct memory access; average access time is 33 milliseconds.

Burroughs offers several of its Super Mini Disk subsystems for use with the CP 9400 and CP 9500 Series, including the B 9489-1, an integrated 1MB drive; the B 9489-11 and -12, two free-standing Super Mini Disk models that provide 1MB and 2MB of storage, respectively; and the B 9489-21 and -23, two 6MB units for use only on the CP 9500 Series. The B 9489-21 is an integral "cold start" drive; the B 9489-21 is a free-standing unit that can be used only as a "warm-start" auxiliary to the B 9489-21.

An industry-compatible diskette unit, the B 9489-17, can be used only with the CP 9500 Series. The B 9489-17 is a free-standing, single-drive unit that provides 243K bytes of data storage.

An operator console used with the CP 9400 and CP 9500 Series is a Burroughs TD 831 display terminal. The TD 831 is a fully-featured editing terminal with a display capacity of 2000 characters, arranged in 25 rows of 80 characters, and a detachable typewriter keyboard with an optional numeric pad. Alternately, a TD 850 or MT 983 may be used on the CP 9582.

On the CP 9400 Series only, the B 9346-4, a 60-cps console printer/keyboard, may be optionally substituted for the TD 831 operator console. On the CP 9558/9572 only, the B 9361-1 display terminal or an MT 983 display terminal may be substituted.

Three 80-column card reader models, three reader/sorters, and an 80-column card punch are available. The B 9115, B 9116, and B 9117 card readers operate at 300,600, and 800 cpm, respectively. The three reader/sorters include an 8-pocket, 900-document-per-minute unit; a 12-pocket, 900 dpm unit; and an 8-pocket, 1000 dpm unit. The B 9418-2 card reader/punch may be used as a card punch only and operates at 45 cpm.

Several models of 9-track magnetic tape drives and magnetic tape cassette units are also offered for use with the CP Series. The 9-track tape drives include the B 9491-2, a 10K-byte NRZ unit, and the B 9491-4, a 10K byte 800 bpi unit; each drive occupies two I/O controller slots. The cassette units include two NRZ units, the B 9490-5 and the B 9497-11, and a PE unit, the B 9497-15; each operates at a speed of 10 inches per second.

PRICING

The CP 9400 and CP 9500 systems are available for purchase or on a one-, three-, or five-year lease. Lease prices include 24 hour, 7-day-a-week maintenance. The software is licensed and priced separately.

The following prices are for CP 9582 hardware. Prices for other CP Series models can be obtained from the vendor.

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Burroughs CP 9400 and CP 9500 Series Communications Processors

		Monthly Charge				
		1-Year Lease	3-Year Lease	5-Year Lease	Purchase	Monthly Maint.
CP 9582	Basic System includes four 3MHz processors, cabinet, power supply, DCP controller synchronizing card (CSC), two 65KB memory modules, two 524KB memory modules, and extended backplane	$1,125	$965	$900	$27,000	$93.00
B 9361-1	Operator Display Terminal with 015 Keyboard (TD 850)	61	52	49	1,471	38.20
B 9361-2	Operator Display Terminal with 015 Keyboard (MT 983)	131	126	123	2,095	22.00
CP 9521-2	ODT Control	22	19	19	630	3.60
CP 9512-1	Memory Module, 65,536 Bytes	31	27	25	750	10.00
CP 9512-3	Memory Module, 262,144 Bytes	73	63	59	1,750	23.50
CP 9512-4	Memory Module, 524,288 Bytes	125	108	100	3,000	40.00
CP 9505-1	Disk File Cache Control	136	117	109	3,250	16.50
CP 9502-3	Processor, 3MHz	73	63	59	1,750	18.00
CP 9503-4	I/O Select Module (Redundancy Option)	73	63	59	1,750	18.00
CP 9522-1	Control for B 9115/B 9116 Card Readers	23	20	19	630	9.40
CP 9523-2	Control for B 9249-1/-2/-3/-4, B 9249-375, B 9246-6/-13, or B 9251 Line Printers	28	18	17	635	9.40
CP 9523-3	Control for B 9247-14/-15 Line Printer	23	20	19	635	9.40
CP 9527-4	Control for B 9489-1/-11 Burroughs-compatible Super Mini-Disk (BSMD)	52	45	42	1,250	8.00
CP 9527-5	Control for B 9489-21 Flexible Disk	52	45	42	1,250	8.00
CP 9527-3	Control for B 9489-17 Industry-compatible Mini-Disk (ICMD)	31	27	26	918	9.40
CP 9528-1	Control for B 9480-12/-22 Cartridge Disk Subsystem	31	27	26	918	9.40
CP 9526-1	Control for B 9493-20/-40/-80 Fixed Disk Drives	31	27	26	918	9.40
CP 9526-2	Control for B 9493-18/-37 Fixed Disk Drives	31	27	26	918	7.60
CP 9528-2	Control for B 9387-11/-12/-41 Disk Pack	39	34	32	1,155	7.90
CP 9529-1	Control for B 9491-4 PE Magnetic Tape Drive	81	70	66	2,410	16.10
CP 9529-2	Control for B 9498 PE Magnetic Tape Drive	89	75	71	1,360	5.50
CP 9503-10	Additional DCP Kit	20	17	16	475	4.00
CP 9530	Line Expansion Module (LEM)	191	167	153	5,697	33.00
CP 9530-1	Line Expansion Unit (LEU)	140	120	113	3,886	16.50
CP 9503-8	LEU—DCP Interface Kit	18	16	15	484	3.30
CP 9530-2	LEU—Dual Host Option	16	14	13	457	3.30
CP 9531-15	50' LEU—DCP Cable	17	15	14	499	N/C
CP 9531-16	25' LEU—DCP Cable	14	13	12	379	N/C
CP 9532-1	Line Adapter (Type II)	27	23	22	788	6.10
CP 9531-5	Data Set Connect Kit (50')	6	6	6	158	N/C
CP 9531-6	Data Set Connect Kit (25')	5	5	5	132	N/C
CP 9531-17	Direct Connect Kit (TDI) for Line Adapter (Type II)	3	3	3	53	N/C
CP 9531-13	ACU Interface Kit (50')	8	7	7	211	N/C
CP 9531-14	ACU Interface Kit (25')	6	5	5	147	N/C
CP 9503-11	DCP Controller Synchronizing Card	11	9	8	250	2.00 ■

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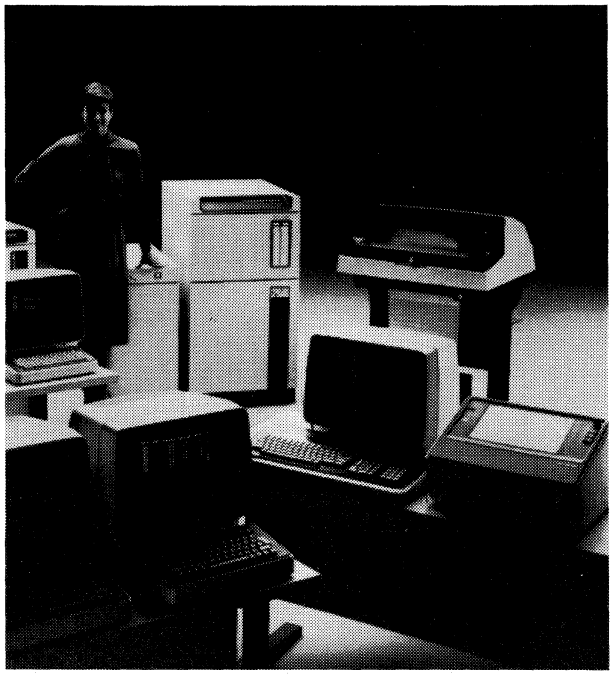
Burroughs CP 9400 and CP 9500 Series Communications Processors



Burrough's latest CP 9500 Series offerings, Models CP 9558 and CP 9572, contain from four to eight independently operating processors that permit the system to be used in a wide variety of transaction-oriented environments. The processor system shown above includes a new Burroughs B 9494 disk drive, B 9246 line printer, and a cluster of Burroughs BMT display terminals.

Two series of remote communications processors designed to be used as network nodes or distributed data processing systems.

The CP 9400 Series consists of newly-packaged configurations of its predecessor B 867 and B 877 systems. Main memory capacity ranges from 96K to 144K bytes. Maximum disk storage capacity is 520MB. Depending on the model, up to 7 or 32 data communications lines can be supported.

The CP 9500 Series consists of multiprocessor systems based on Burroughs' new B 900 Series architecture. Each processor provides its own dedicated memory. Depending on the configuration, four to eight processors, containing an aggregate of from 320K to 1.5MB of main memory may be used, and up to 5 or 12 data communications lines supported. Maximum disk storage capacity is over 391.2MB.

A typical CP 9558 system, with 5 processors, 512K bytes of aggregate main memory, a 6MB dual-drive diskette subsystem, 19.3MB of disk storage, and four data communications lines, is priced at $39,184, or $1,148 per month on a three-year lease including 24-hour, 7-day-per-week maintenance.

MANAGEMENT SUMMARY

In January 1980, Burroughs announced two new series of communications processors, the CP 9400 Series and CP 9500 Series, for use as remote data processing nodes in large communications networks and distributed processing operations. The new processors can be used in a wide range of environments and can serve as anything from a remote terminal controller or RJE system acting in support of a large Burroughs or non-Burroughs central host, to a complete distributed processing operation with its own data files, local processing activities, and terminals.

The new products effectively supersede Burroughs previous line of remote communications processors, the B 867 and B 877. Like their predecessors, the CP 9400 and CP 9500 can communicate with a host computer only remotely via data communications lines. Facilities for Burroughs channel-attached front-end applications will continue to be provided by a specially-modified B 800 computer, the B 874, which has been designed for this purpose.

The CP 9400 Series systems are newly-packaged configurations of the predecessor B 867 and B 877 communications processors. New features include increased memory capacity for the data communications processor (from 6K to 8K words), improved cabinet

CHARACTERISTICS

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

DATE OF ANNOUNCEMENT: CP 9400 and CP 9500 Series—March 1980; Models CP 9552 and CP 9572—August 1980.

DATE OF FIRST DELIVERY: CP 9400 Series—January 1980; CP 9500 Series—May 1980; Models CP 9552 and CP 9572—Fourth quarter 1980.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: Burroughs Corporation.

CONFIGURATION

CP 9400 SERIES

The CP 9400 Series Communications Processor Systems are newly-packaged configurations of Burroughs' B 870/B 860 Series communications processors that feature increased memory capacity for data communications functions, improved cabinet styling, and lower prices than their predecessor models. The CP 9400 systems provide two processors: a data communications processor (DCP) and a main processor that handles all other system functions. The

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Burroughs CP 9400 and CP 9500 Series Communications Processors

styling, and a lower price range. The CP 9400 comes in three basic models: Model CP 9452 provides 96K to 144K bytes of main processor memory, one 8K-word data communications processor, a system console, a 1MB diskette drive for system loading, an 18.8MB fixed disk drive, and support for up to 7 data communications lines; Model CP 9471 provides 112K to 144K bytes of main memory, one or two 8K-word data communications processors, a system console, a 1MB diskette drive, an 18.8MB fixed drive, and support for up to 32 data communications lines; Model CP 9472 provides 112K to 144K bytes of main memory, one or two 8K-word data communications processors, a system console, a 1MB diskette drive, a 130.4MB dual-drive disk pack, and support for up to 32 data communications lines. On any of the models, disk capacity can be expanded using fixed disk, cartridge disk, or diskette options, up to a maximum capacity of 520MB. A wide selection of other peripherals may be added to CP 9400 systems, including a choice of three card readers, three card reader/sorters, a card punch, seven line printers (ranging in space from 85 lpm to 750 lpm), two half-inch magnetic tape drives, and three tape cassette units.

The CP 9500 Series systems are based on Burroughs' newly-designed B 900 Series multiprocessor architecture, and utilize four to eight independent processors, each operating concurrently with the others and performing its dedicated set of functions: operating control, file management, compilation and execution of user programs, or data communications. Two generations of CP 9500 Series models have thus far been introduced: the CP 9551/9555/9556, announced in January 1980, are non-expandable four-processor configurations; the CP 9558 and CP 9572, introduced in August 1980 and expected to supercede the original models, contain four and five processors in their basic configurations, and are expandable to six and eight processors, respectively. Although each processor has its own dedicated memory, the aggregate total memory capacity for a CP 9500 system ranges from 320K bytes up to 1.5MB. A 6MB diskette unit is the standard on-line storage and system loading device in all models. Maximum disk capacity is 154.8MB for the CP 9551/9555/9556 Systems, and over 391.2MB (with the disk pack option) for the CP 9558/9572. Support for up to five data communications lines, or up to twelve lines on CP 9558 and CP 9572 models, is provided. Other peripherals that may be added to CP 9500 systems include an operator console, a choice of six line printers, and an industry-compatible diskette drive. Disk pack and magnetic tape peripherals will be supported starting in 1981.

Several of the peripherals that can be used with the CP 9400 and CP 9500 Series were announced with the series in January 1980. These include the Model B 9246-3/-6 line printers, which operate at 320 lpm and 650 lpm respectively and include a 12-channel format tape reader as a standard feature; the Model B 9493-20/-40/-80 single-spindle fixed disk drives, which provide capacities of 19.3, 38.7, and 77.4MB, respectively; and the Model B 9489-21/-23 dual-drive 6MB diskette subsystems, which come

DCP operates independently to offload the main processor from data communications tasks, provide a first level of error detection and correction, and provide interfaces for devices communicating with the main processor. The main processor provides the main memory subsystem for all operating system and applications program code. The DCP provides a separate memory of 8K words in which data communications routines are housed and executed.

The 9400 Series is available in three basic models as follows:

- **CP 9452—includes a 2 MHz main processor with 96K bytes of main memory, cabinet, power supply, and real-time clock; a Burroughs Model TD 831 display terminal with keyboard for use as an operator console; a display control; an integral 1MB diskette drive; an 18.8MB fixed disk drive; a DCP that supports up to 7 half or full duplex data communications lines; a 7-line base and expander; two TDI/modem line adapters; and two direct connect kits. The diskette and disk drives are controlled by a Universal Disk Control and Disk Exchange, which also provide control logic for two additional optional fixed disk, cartridge disk, or diskette drives. A printer/keyboard console may optionally be substituted for the display/keyboard console for the difference in price.**

  Also, for the difference in price, one to four 4.6MB or 9.2MB cartridge disk drives, cartridge disk controller, and cartridge disk exchange may optionally be substituted for the 18.8MB fixed disk drive, Universal Disk Controller, and Disk Exchange. The 1MB diskette unit may but is not required to be kept; if kept, it will require a dedicated diskette control. If this option is taken, no other disk units may be added to the system as peripherals.

- **CP 9471—identical in configuration to the CP 9452 except that it provides 112K bytes of main memory instead of 96K, has a free-standing 1MB diskette drive instead of an integral 1MB drive, provides a DCP that supports up to 16 half or full duplex lines instead of 7, and comes with a 4-line base and expander.**

- **CP 9472—indentical in configuration to the CP 9471 except for its disk components. Instead of an 18.8MB fixed disk drive, the Universal Disk Control, and the Disk Exchange, the CP 9472 provides a 130.4MB dual-drive disk pack with an electronic controller that supports three additional disk packs, and a disk pack control. The free-standing 1MB diskette unit provided on the CP 9471 is also included as a standard feature on the CP 9472, but is controlled by a dedicated diskette control.**

Options to the basic CP 9400 configurations are of three types: main memory add-ons, peripheral devices, and data communications features.

Main memory is expandable on the CP 9452 in 8K or 24K increments, and on the CP 9471/9472 in 8K increments only, up to a maximum capacity of 144K bytes.

Peripherals available for the CP 9400 Series include three 80-column card readers; a 45-cpm card punch; three card reader/sorters; 7 models of line printers, ranging in speed from 85 to 750 lines per minute; a choice of two 9-track magnetic tape units; a choice of three tape cassette units; and a variety of fixed disk, cartridge disk, and diskette units.

Unassigned I/O channels are available for the attachment of peripherals to the basic system. Model CP 9452 provides up to three additional I/O channels; and Models CP 9471 and CP 9472, up to four additional I/O channels. An I/O Expansion Module, available as an option for the CP 9471 and CP 9472 only, adds four more I/O channels to the system for attachment of additional peripherals, for a total system maximum of eight channels. Generally, one I/O channel is used for each I/O device control and, generally, each I/O

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Table 1. CP 9500 Series Disk Options

One disk option must be selected for each CP 9500 system, consisting of one "cold start" drive and (optionally) one "warm start" drive*, plus one disk loader model per Disk Option and one disk control per drive. Option E is provided with basic CP 9551/9555/9556 systems as standard, but any of the other four Disk Options may be substituted for Option E. If Option F is selected, certain additional fixed, cartridge or diskette drives may also be included in the system.

Disk Option	Disk Loader Module	"Cold Start" Disk Drives			"Warm Start" Disk Drives		
		Control	Models	Type	Control	Models	Type
A	CP 9543-1 or CP 9543-11	CP 9527-1	B 9489-1	1MB integral diskette	CP 9526-2	B 9493-9/-18 or	9.4/18.8MB fixed disk
					CP 9528-1	B 9480-12/-22 or	4.6MB cartridge disk
					CP 9528-1	B 9481-12	9.2MB cartridge disk
B	CP 9543-2 or CP 9543-12	CP 9528-1	B 9480-12/-22	4.6MB cartridge disk	—	None or	—
			B 9481-12	9.2MB cartridge disk	Cp 9526-2	B 9493-9/-18 or	9.4/18.8MB fixed disk
					CP 9528-1	B 9480-12/-22 or	4.6MB cartridge disk
					CP 9528-1	B 9481-12	9.2MB cartridge disk
C	CP 9543-3**	CP 9527-1	B 9489-1	1MB integral diskette	CP 9526-1	B 9493-20/-40/-80	19.3/38.7/77.4 fixed disk*
D	CP 9543-4**	CP 9528-1	B 9480-12/-22	4.6MB cartridge disk	CP 9526-1	B 9493-20/-40/-80	19.3/38.7/77.4 fixed disk*
E	CP 9543-5 or CP 9543-13	CP 9527-2	B 9489-21	6MB integral diskette	—	None or	—
					CP 9527-2	B 9489-23 or	6MB external diskette
					CP 9526-1	B 9493-20/-40/-80	19.3/38.7/77.4 fixed disk*
F	CP 9543-14***	CP 9527-1	B 9489-1	1MB integral diskette	CP 9528-2	B 9387-11/-12	65.2/130.4MB disk pack

*Up to two B 9493-20/-40/-80 drives may be attached; each requires its own controller.
**Available for CP 9551/9555/9556 models only.
***Available for CP 9558/9572 only.

in built-in or free-standing versions. The new line printers may be used with either the CP 9400 or CP 9500 Series; the new diskette and fixed disk units can only be used with CP 9500 Series systems.

For customers who are upgrading from a predecessor communications processor system, Burroughs has designed the CP 9500 systems to be able to accommodate existing disk peripherals as substitutes for the newly released CP 9500 disk components that are configured as standard with these systems. For example, on the CP 9551 system, a 4.6MB or 9.2MB cartridge disk (a Model B 9480-12/-22 or B 9481-12) may be used in lieu of the new 6MB integral diskette subsystem. On the other CP 9500 models, the 4.6MB or 9.2MB cartridge disk, or a B 9489-17 1MB diskette unit, may be used for system loading instead of the standard 6MB diskette; and one of the cartridge disk units, or a 9.4MB or 18.8MB fixed disk drive (a Model B 9493-9/-18), may be used as a substitute for the new 19.3MB or 77.4MB fixed disk drive provided on the basic unit.

Offered with the systems, on an unbundled basis, is a wide range of software products designed for use in an on-line transaction-oriented environment, including a full-function operating system, extensive software support for on-line programming and on-line data entry, and RPG and COBOL programming language compilers. The operating system consists of two basic modules, the Computer Management System (CMS) and the Computer Management Distributed Information System (CMDIS), which are compatible with both the

device control can support one peripheral unit. Exceptions are that the CP 9425-5 magnetic tape control requires two I/O channels, and that most of the disk controls support multiple drives. Any combination of peripherals is acceptable; each peripheral may be of a different type, or multiple devices of the same type may be added. The maximum amount of removable disk storage configurable is 520MB.

Each system's DCP provides for the addition of optional data communications features to supplement the ones provided with the basic system. Each basic system includes a complete set of attachment features for two data communications lines as standard. On the CP 9452, attachment features for five additional lines can optionally be added, providing for a total system maximum of seven data communications lines. On the CP 9471 and CP 9472 (which are identical in their data communication capabilities and configuration), attachment features for 14 additional lines can optionally be supported by the basic system's DCP. If more than 16 lines are required, a second DCP can be added to the CP 9471 or CP 9472: if the optional I/O Expansion Module has been installed on the system, this second DCP can support up to four additional lines, for a total system maximum of 20 lines; if the I/O Expansion Module is not installed, the second DCP can support up to 16 additional lines, for a total system maximum of 32 lines.

CP 9500 SERIES

The CP 9500 Series Communications Processor Systems are built on a new multiprogramming and multiprocessing architecture similar to that utilized by Burroughs for their B 900 Series of computers. The systems are designed as small compact units and provide high-density disk storage with printer back-up. They can be controlled either locally by a directly attached dedicated console, or remotely using any TD 831 or MT 983 display/keyboard. Two new line printers,

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Burroughs CP 9400 and CP 9500 Series Communications Processors

predecessor B 867 and B 877 systems' software and with Burroughs B 80, B 90, B 900, B 1800, and B 1900 mainframes. Numerous Computer Management program products provide for on-line data entry, on-line file maintenance and inquiry, message handling, system-to-system RJE operations, and other functions. Communications packages are available for Burroughs-standard RJE; IBM 360/20 HASP, 2780/3780, or 3270 emulation; Burroughs Network Architecture (BNA) compatibility (for CP 9500 only; available September 1981); IBM Systems Network Architecture (SNA) compatibility; and interfacing with Canada's DATAPAC public packet switching network using the X.25 protocol. □

three new fixed disk drives, and a 6MB diskette subsystem were introduced with the CP 9500 Series.

The CP 9500 systems provide four types of processors, each of which has its own dedicated memory and operates independently to perform a specific set of functions: an operating system processor, a file management processor, an applications processor, and a data communications processor. Depending on the model, one or more of each type of processor may be configured with the system. Each processor is connected to the system' memory bus so that, when necessary, information exchanges can take place between the processors.

The CP 9500 Series is available in five basic models as follows:

- **CP 9551—includes four 1 MHz processors, cabinet, power supply, and time-of-day clock; an integral 6MB dual-drive diskette subsystem; a diskette control; a disk loader module; two Type 1 line adapters; one modem connect kit; and one direct connect kit. The operating system processor provides 128K bytes of main memory and the other three processors each have 64K-byte memories, for a system total of 320K bytes. Unlike the 9400 Series, no console or hard disk storage is bundled into the basic CP 9551 system.**

- **CP 9555—identical in configuration to the CP 9551, except that the CP 9555 also includes a 19.3MB fixed disk drive and a fixed disk control.**

- **CP 9556—identical in configuration to the CP 9555, except that the CP 9556 includes an additional 64K bytes (or a total of 128K bytes) of memory in its application processor, and provides a 77.4MB fixed disk drive in lieu of the 19.3MB drive.**

- **CP 9558—includes four 2 MHz processors, cabinet, power supply, and real-time clock. The operating system processor and the applications processor each provide 128K bytes of main memory; the data communications processor, 64K bytes; and the file management processor, 32K bytes. Total aggregate main memory is therefore 352K bytes. No disk, diskette, or communications components are included in the basic system.**

- **CP 9572—identical in configuration to the CP 9558 except for doubling of the operating system's memory size to 256K and the addition of a second applications processor that contains a 128K byte main memory, for a total aggregate main memory capacity of 608K bytes.**

Options to the basic CP 9500 configurations are of four types: main memory add-ons, processor add-ons, peripheral devices, and data communications features.

Additional 64K-byte memory modules, or (for the CP 9558 and CP 9572 only) 128K-byte memory modules, may be added to the operating system processor, up to a maximum capacity of 256K bytes. The applications processor memory is also expandable in 64K- or 128K-byte increments, up to a maximum of 256K bytes. No memory expansion is permitted for the file management or data communications processors, except that on the CP 9558/9572 only, the data communications processor 64K-byte memory module may be replaced by a 128K-byte module.

Additional processors may be added to the CP 9558 and CP 9572 systems only. The CP 9558 can be expanded up to a six-processor system by adding two applications processors or, alternatively, one applications processor and one data communications processor. The CP 9572 can be expanded to up to eight processors by adding two applications processors plus one data communications processor, or three applications processors. On the CP 9572 only, a special option, the Input/Output Select Module, allows one of the applications processors to be manually switched over to serve as a back-up operating system processor or file management processor, thereby providing redundancy for their functions.

The maximum memory capacity for the entire system is 640K bytes for the CP 9551/9555/9558 systems, 1.2MB for the CP 9558, and 1.5MB for the CP 9572.

Peripherals available for the CP 9500 Series include an operator console, a choice of six line printers, a free-standing industry-compatible diskette unit, a magnetic tape drive, and a variety of Burroughs-compatible diskette, cartridge disk, fixed disk, and disk pack options. A controller is required for connection of each peripheral unit to the system, and provides the interface between the peripheral and the I/O channel to which it is attached; in the case of the disk options, one disk loader module is also required.

All peripherals except the disk/diskette units are interfaced to the operating system processor. The operator console is a Burroughs TD 831 display/keyboard, which may be locally or, using the Remote Supervisory Control (RSC) software, remotely attached. Alternative consoles, such as an MT 983, are available for the CP 9558 and CP 9572 systems. Up to two line printers may be configured with the system. The line printers are available in various models that come with or without a 12-channel format tape reader and range in speed from 85 lpm to 650 lpm. Line printer models offered are the same as for the 9400 Series, except that the B 9247-16 printer, an older 750-lpm unit, is not available for use with the CP 9500 Series. The industry-compatible diskette unit is a free-standing single-drive unit that holds up to 243K bytes of data. The magnetic tape drive is a 9-track, 1600 bpi PE unit with a capacity of 40K bytes.

Burroughs' disk subsystems are interfaced to the file management processor, which provides up to two I/O channels for the attachment of the drives. One disk subsystem is required and must consist of single-drive removable "cold start" disk subsystem, which is needed for system load functions and may also be used for data storage and additional system operations. A second disk subsystem for additional data storage only is optional and must be a "warm start" disk subsystem. In all cases except one, the second subsystem is a single-drive unit; the exceptions are that when the new B 9493-20/-40/-80 fixed disk is used, two drives may be attached (each requires its own control), and when the B 9387-12 disk pack subsystem is used, two incremental dual-drive packs may be attached. The user must select from six specified disk configuration options, which consist of various combinations of "cold start" and "warm start" drives (see Table 1). Burroughs has selected "Option E", which consists of its newest diskette and fixed disk drives, as the standard selection bundled into the basic CP 9551/9555/9556 systems; however, any of the other options may be substituted in its place, for the difference in price.

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Models CP 9551/9555/9556 can support a total of five data communications lines and come equipped with two complete sets of data communication line attachment features plus the logic to handle three additional lines.

The CP 9558 and CP 9572 can each support up to five lines if CP 9531-1/-7 line adapters are used, or up to twelve lines if CP 9532-1 line adapters are used. The maximum number of lines per system remains the same whether a second DCP is configured or not. The maximum aggregate throughput supported is 96,000 bps per DCP. No attachment features come standard with the basic system.

CONNECTION TO HOST COMPUTER: CP 9400 and CP 9500 systems can be connected to Burroughs or non-Burroughs host computers through data communications lines. The systems do not support high speed parallel transfer to a host.

TRANSMISSION SPECIFICATIONS

CP 9400 SERIES

Connection of data communications lines to the DCP involves the use of four types of attachment features: line bases, line expanders, line adapters, and connect kits.

One line base and one line expander are provided as standard on each basic system. On the CP 9452, the standard line base/expander pair can handle up to seven lines; since this is the maximum number of lines for the system, no additional base/expander pairs can be added. On the CP 9471 and CP 9472, three additional line base/expander pairs can be added to the first DCP, in addition to the standard pair; each pair can handle up to four lines. If a second DCP has been installed, one line base/expander pair must be added for each set of four lines to be attached. Depending on the line base selected, half duplex only, or half and full duplex, transmission can be supported.

The specific type of interfacing required by each line being connected is provided by line adapters. One line adapter is needed per line. One style of line adapter provides an RS-232-C-compatible modem interface, a Burroughs-compatible two-wire direct interface (TDI), or a Burroughs direct interface (BDI). The other style provides a Burroughs Data Link Control (BDLC) interface.

The RS-232-C interface supports asynchronous transmission at up to 1800 bps and synchronous transmission at up to 9600 bps; a DDS data service unit can be installed for access to AT&T's Dataphone Digital Service. The TDI interface supports asynchronous transmission at up to 9600 bps; and the BDI interface, up to 19,200 bps. The BDLC interface requires two line adapter slots in the DCP and supports synchronous modem connection only, at up to 9600 bps.

The connection kits provide the connections that physically attach the lines to the line adapters. Kits are available for RS-232-C (modem) or TDI/BDI (direct) connection.

On the CP 9471 and CP 9472 only, the DCP can support one dual-line auto-call unit interface, which permits automatic dialing of two data communications lines via a Bell 801A Automatic Calling Unit.

Line types may be attached in any combination, as long as the DCP's aggregate throughput maximum is not exceeded. Throughput limits depend on the operating mode of the DCP. When operating in "interpretive " mode, the DCP memory is used to store the Network Definition Language (NDL) interpreter, and NDL program code, which is stored in the main system memory, is translated into object code and executed instruction-by-instruction by the DCP as the program runs; when operating in "non-interpretive" mode, NDL programs are compiled and stored in microcode for later execution by the DCP. In "interpretive" mode, the DCP can handle an aggregate throughput of up to 19,200 bps; in "non-interpretive" mode, the aggregate maximum throughput is increased to 56,000 bps.

CP 9500 SERIES

Connection of data communications lines to the data communications processor involves the use of two types of attachment features: line adapters and connect kits. On the CP 9551/9555/9556, two line adapters and connect kits (one for a modem connection and the other for a direct connection) are included in the basic system; up to three additional sets of line adapters and connectors can be added, providing support for a maximum of five lines. On the CP 9558 and CP 9572, no attachment features are standard, and up to 12 sets of line adapters and connectors can be added.

Two types of line adapters are provided for use on any CP 9500 system. The Type 1 Line Adapter provides interfacing for an RS-232-C modem connection, a Burroughs direct interface (BDI), or a Burroughs-compatible two-wire direct interface (TDI). The second style provides a Burroughs Data Link Control (BDLC) interface. A third line adapter, the Type 2 Line Adapter, can be used only on CP 9558/9572 systems that include neither of the other two adapters. It provides either BDLC or non-BDLC interfacing for both modem and direct connections, and direct connections, and allows the system to support a greater number of lines (twelve instead of five).

The RS-232-C interface supports asynchronous transmission at up to 1800 bps and synchronous transmission at up to 9600 bps; a DDS data service unit can be installed for access to AT&T's Dataphone Digital Service. The BDI interface supports asynchronous transmission at up to 19,200 bps. The TDI interface supports direct connections at a rate of up to 9600 bps for devices located within 1000 feet of the processor; 19,200 bps for devices located within 500 feet; and 38,400 bps for devices located within 250 feet. The BDLC interface (which, unlike the CP 9400's BDLC interface, occupies just one processor slot) supports synchronous modem connection only, at up to 9600 bps.

The connection kits are available for RS-232-C (modem) or TDI (direct) connection.

The data communications processor can also support one auto-call unit interface per line adapter, which permits automatic dialing of that line via a Bell 801 Automatic Calling Unit.

SOFTWARE

CP 9400 and CP 9500 systems utilize Burroughs' Computer Management Transaction Control System (CM TCS-1) as their basic operating software. CM TCS-1 is a modular package of control software that provides support for operations in an on-line transaction processing environment. Its two basic elements are the Computer Management System (CMS) and the Computer Management Distributed Information System (CMDIS). Computer Management programs are compatible both with predecessor Burroughs communications processor systems, and with Burroughs B 80/B 90/B 900/B 1800/B 1900 mainframes. For example, existing CMS programs running on a B 870/B 860/B 771 communications processor may be transferred to a CP 9400 system without recompilation; transfer to a CP 9500 system simply requires recompilation of the NDL programs. Recompilation of the NDL programs is also required to assure compatibility with the mainframe systems.

CMS consists of five software components: the Master Control Program, a Utilities package, the Data Communi-

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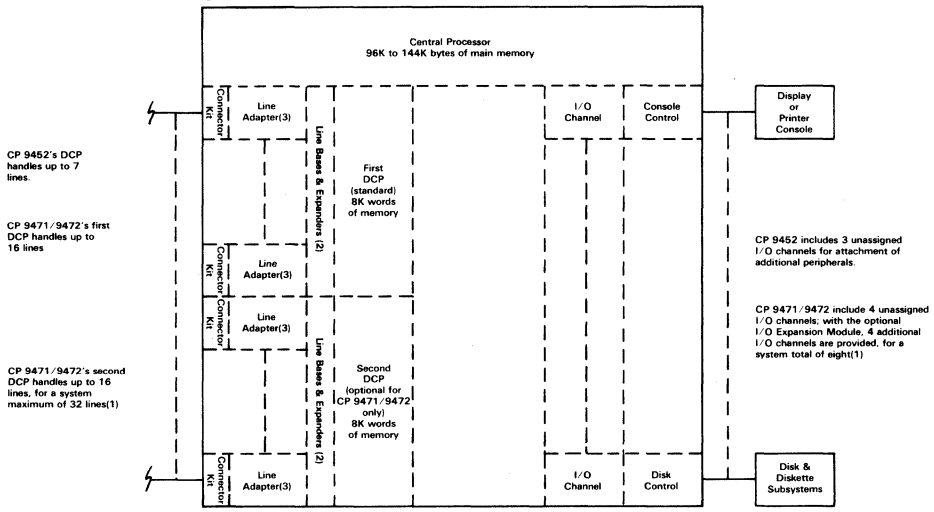
Burroughs CP 9400 and CP 9500 Series Communications Processors

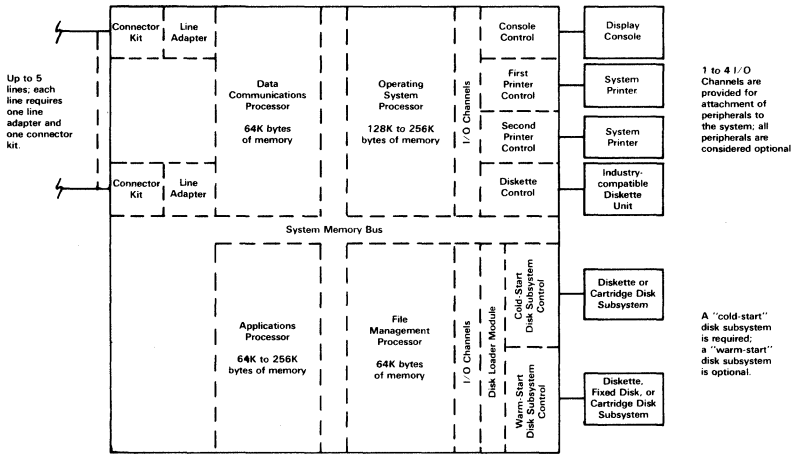
Configuration

CP 9400 Series

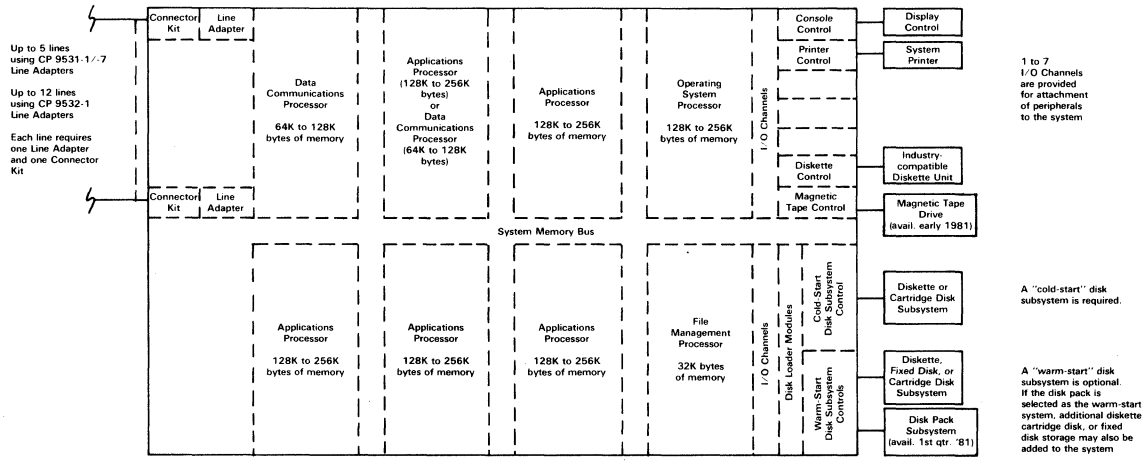


(1) Installation of an I/O Expansion Module restricts the number of lines that can be handled by the second DCP to 4.
(2) One line base & expander pair is standard on each system. The CP 9452's standard base and expander pair handles up to 7 lines. The CP 9471/9472's standard base and expander pair handles up to 4 lines; one additional pair is required to support each additional set of four lines.
(3) One line adapter and connector kit are required for connection of each line.

CP 9551/9555/9556



CP 9558/9572



CP 9558 configuration includes one operating system processor, one file management processor, one data communications processor, and one applications processor as standard components. Two additional applications processors, or one applications processor and one data communications processor, may optionally be added, for a total system maximum of six processors, or 1.2MB of aggregate main memory.

CP 9572 configuration includes one operating system processor, one file management processor, one data communications processor, and two applications processors as standard components. Three additional applications processors, or two applications processors and one data communications processor may optionally be added, for a total system maximum of eight processors, or 1.5MB of aggregate main memory.

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cations Installation Tool, the Network Definition Language compiler, and the Message Processing Language compiler.

The Master Control Program (MCP) is the CP 9400 and CP 9500 operating system and controls all other system functions. MCP features multiprogramming, multiprocessing (CP 9500 version only), virtual memory, dynamic resource allocation, and I/O control.

The Utilities package provides various system routines to be used for system initialization; program development; conventional and indexed sequential file sort, merge, remove, copy and print functions; system diagnostics; and printer back-up.

The Data Communications Installation Tool (DIT), a new package released with the CP 9400 and CP 9500 Series, is a diagnostic aid for data communications functions designed to aid in initial system installation, subsequent installation of additional lines/terminals, and troubleshooting data communications problems.

The Network Definition Language (NDL) compiler is used to develop the system's Network Control Program. NDL is a parameterized user-oriented language used to describe the system's data communications environment. NDL statements define the lines, modems, terminals, line speeds, character translation, etc. Using these statements, the NDL compiler generates the code and tables required for the Network Control Program.

The Message Processing Language (MPL-II) compiler is used to develop Message Control Systems (MCS) programs. MCS is a key function of CMS used to interface NDL programs with applications programs, and provides a single point where all messages are reviewed, performing such functions as security, message validation and routing, and network error handling before messages are directed to the applications program. The MPL-II language is made up of parameterized user-oriented statements that permit the user to program the MCS to meet the specific requirements of their installation.

CMDIS is a new package released with the CP 9400 and CP 9500 Series that supports on-line programming, on-line data entry, program-to-program communications, and provides interfacing with Burroughs or IBM hosts, other CP 9400/9500 systems, and packet-switching networks. The user may choose between two basic CMDIS packages, the Transaction Distribution System, or the Generalized Message Control System, which are used to control specific CMDIS program products.

The Transaction Distribution System (TDS) is designed for the user who wishes to combine on-line data entry and RJE functions in a distributed processing environment with minimal modification to existing software, and is made up of two modules: the Transaction NDL module, a tailored version of NDL that provides a predefined set of terminal descriptions and line configurations from which the user may dynamically assign stations and lines; and the Transaction MCS module, which allows applications programs to be developed and run independently of the network and handles network initialization, network reconfiguration, network error correction, data communications file, and console command functions. TDS functions can be executed concurrently with Burroughs Network Architecture interface, the IBM Systems Network Architecture interface, the Remote Supervisory Console program, or any of the CDMIS program products designed to function with it.

The Generalized Message Control System (GEMCOS) permits a higher degree of network sophistication than TDS, with which it is upward-compatible. GEMCOS provides a number of features that may be added to a generated MCS program, including security and audit trails, transaction routing, alternate routing, and message formatting. Four implementation levels of GEMCOS are offered by Burroughs: GEMCOS Basic, which is included in the CM TCS-1 package, but can also be purchased separately; GEMCOS TCL Compiler; GEMCOS Formatting Module; and GEMCOS Complete System. GEMCOS functions can be executed concurrently with the Burroughs Network Architecture interface, the IBM Systems Network Architecture interface, the Remote Supervisory Console program, and any of the CMDIS program products.

Applications programs may be written in COBOL or RPG. The CMS COBOL compiler is an enhanced subset of ANSI 74 COBOL that includes extensions designed to take advantage of specific Burroughs operating system and hardware capabilities, and can be used for either communications-oriented or batch-oriented user programs. The CMS RPG compiler is based upon industry standards and can be used for off-line batch-programs.

Numerous CDMIS program products are available to users of the CP 9400 and CP 9500 systems, including CANDE, ODESY, SYCOM, Remote Supervisory Console, Inquiry, Store-and-Forward Message Switch, DOMAIN, On-line REPORTER, Audit Entry Host Utilities, Business Management Systems, four different data communications packages, and interfaces to Burroughs Network Architecture (BNA), IBM Systems Network Architecture (SNA), and X.25-compatible public packet-switching networks (Canadian DATAPAC System only).

CANDE (Command AND Edit Language) permits terminal operators at remote sites to create and update files interactively using a user-oriented set of commands similar to those used with Burroughs B 7000/B 1000 CANDE systems. ODESY (On-line Data Entry System) controls data entry to the CP 9400 and CP 9500 from up to sixteen terminal users simultaneously. ODESY prompts the user for the data to be entered using screen formats; audits, verifies, and reformats the entered data; and provides a statistical analysis and (optionally) a formatted journal listing of its transactions. SYCOM provides for enhanced system-to-system RJE operations, including file transfers between systems, terminal-to-program communications, and program-to-program communications.

Remote Supervisory Console (RCS) is available only for use with CP 9500 systems with an installed GEMCOS package, and allows a TD 830 or MT 983 display terminal attached to the system via the data communications processor to take over the command console function from the dedicated system console. The TD 830 or MT 983 can be attached via a direct-connect or a modem-connect facility. It does not have to be dedicated to this function, and can be utilized for normal terminal operations concurrently with its console function.

Inquiry is a terminal-based inquiry/response package that runs under either TDS or GEMCOS.

Store and Forward Message Switch is used only with CP 9400 systems, and provides the user with a package of standard message-switching functions, which may be modified to user requirements.

DOMAIN is an application development aid for on-line file maintenance and inquiry. On-Line REPORTER is another application development aid for interactive extraction of information from a data file and creation of reports for output to a display or printer. Audit Entry Host Utilities is a package that permits data to be captured from off-line Burroughs audit entry equipment, audited, verified, and stored on magnetic media for later use. Business Management Systems is a group of program products for general accounting and

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management reporting applications. DOMAIN, On-Line REPORTER, Audit Entry Host Utilities, and Business Management Systems operate only under the GEMCOS software.

Data communications programs are provided for: batch-oriented communications to larger Burroughs systems using standard Burroughs Remote Job Entry protocol; remote batch terminal emulation of an IBM 360/20 system operating under the standard HASP multileaving protocol; batch-orientation operation in IBM 2780/3780 terminal mode; and interactive terminal operations using the IBM 3270 protocol (plug-for-plug replacement of IBM 3270 components is not supported).

The BNA interface is offered for CP 9500 systems only and will not be available for those systems until September 1981. BNA functions will include remote data base access,file transfer, resource sharing, and processor-to-processor communications among multiple Burroughs systems; point-to-point data communications under Burroughs Data Link Control (BDLC) protocol; and interfacing to X.25-compatible packet-switching networks. The BNA package will provide the CP 9500 with both host and network services, allowing it to exist in the network as a cooperating peer with a larger Burroughs system. The BNA interface will operate only under GEMCOS software.

The IBM SNA interface allows a CP 9400 or CP 9500 system to operate as an SNA Physical Unit Type 2 (PU.T2); as such, it will appear to the IBM host as a cluster controller with multiple devices attached.

The X.25 interface permits user programs within a CP 9400 or CP 9500 to use the services of the Canadian DATAPAC packet-switching network for communications with programs on another system. The X.25 package handles all the details of performing calls, directing circuit procedures, assembling/disassembling packets, and other packet-switching functions in a manner transparent to the user. The system physically interfaces with the network via full duplex lines at speeds up to 9600 bps under CCITT's standard HDLC protocol.

PERIPHERALS

Line printers offered include: the B 9249 Series, which includes 85, 160, 250, and 350 lpm models; the B 9246-3 and -6, newly released with the CP 9400 and CP 9500 Series, which operate at 320 lpm and 650 lpm with a 48-character set and 300 lpm and 600 lpm with a 64-character set, respectively; and the B 9247-16, an older 750 lpm unit available for use with the CP 9400 Series only. All models feature 132 print positions per line and operator-changeable print bands, and provide a 12-channel format tape reader as either standard or optional.

Fixed disk drives include: the B 9493-9 and -18, a pair of single-spindle drives that provide 9.4MB and 18.8MB capacities, respectively; the B 9493-28 and -37, dual-spindle versions of the B 9493-9/-18 with double the data storage capacities (available for use with the CP 9400 Series systems only, on which each counts as two I/O devices); and the B 9493-20, -40, and -80, three new single-spindle Winchester-type units released with and available for use only on the CP 9500 Series that provide 19.3MB, 38.7MB, and 77.4MB of storage respectively. All fixed disk models feature an average access time, including head movement and rotational delay, of 55 milliseconds.

Three models of cartridge disk units are offered: the B 9480-12, which features 4.6MB of storage and an average access time of 80 milliseconds; the B 9480-22, which has 4.6MB of storage and an average access time of 145 milliseconds; and the B 9481-12, which provides a 9.2MB storage capacity and a 100 millisecond access time.

Dual disk pack drives are currently available for the CP 9400 Series only (but will become available for the CP 9558/9572 in third quarter 1981) and include: the B 9387-11, a 65.2MB unit with electronic controller; the B 9387-12, a 130.4MB unit with electronic controller; and the B 9484-5, a 130.4MB unit that is used as an add-on drive to the B 9387-12. The electronic controller handles all internal disk functions, such as addressing, sector management, and exchanges between multiple drives. Up to three add-on drives may be accommodated by the B 9387-12's controller. All disk pack drives have direct memory access; average access time is 33 milliseconds.

Burroughs offers several of its Super Mini Disk subsystems for use with the CP 9400 and CP 9500 Series, including the B 9489-1, an integrated 1MB drive; the B 9489-11 and -12, two free-standing Super Mini Disk models that provide 1MB and 2MB of storage, respectively (available for use with the CP 9400 series only); and the B 9489-21 and -23, two new 6MB units released with an available for use only on the CP 9500 Series. The B 9489-21 is an integral "cold start" drive; the B 9489-21 is a free-standing unit that can be used only as a "warm-start" auxiliary to the B 9489-21.

One industry-compatible diskette unit, the B 9489-17, is also offered, and can be used only with the CP 9500 Series. The B 9489-17 is a free-standing, single-drive unit that provides 243K bytes of data storage.

The operator console used with the CP 9400 and CP 9500 Series is a Burroughs TD 831 display terminal. The TD 831 is a fully-featured editing terminal with a display capacity of 2000 characters, arranged in 25 rows of 80 characters, and a detachable typewriter keyboard with an optional numeric pad.

On the CP 9400 Series only, the B 9346-4, a 60-cps console printer/keyboard, may be optionally substituted for the TD 831 operator console. On the CP 9558/9572 only, the B 9361-1 display terminal or an MT 983 display terminal may be substituted.

Three 80-column card reader models, three reader/sorters, and an 80-column card punch are available for use with the CP 9400 Series only. The B 9115, B 9116, and B 9117 card readers operate at 300, 600, and 800 cpm, respectively. The three reader/sorters include an 8-pocket, 900-document-per-minute unit; a 12-pocket, 900 dpm unit; and an 8-pocket, 1000 dpm unit. The B 9418-2 card reader/punch may be used as a card punch only and operates at 45 cpm.

Two models of 9-track magnetic tape drives and three models of magnetic tape cassette units are also offered for use with the CP 9400 Series only. (Model B 9491-4 will become available for the CP 9558/9572 in first quarter 1981.) The 9-track tape drives include the B 9491-2, a 10K-byte NRZ unit, and the B 9491-4, a 40K-byte 1600 bpi unit; each drive occupies two I/O controller slots. The cassette units include two NRZ units, the B 9490-5 and the B 9497-11, and a PE unit, the B 9497-15; each operates at a speed of 10 inches per second.

PRICING

The CP 9400 and CP 9500 systems are available for purchase or on a one-, three-, or five-year lease. Lease prices include 24 hour, 7-day-a-week maintenance. A separate contract is available for purchase units that provides for prime-shift maintenance.

All CP 9400 and CP 9500 software is unbundled and is available under either of two plans. The Unlimited Time Plan charges include a one-time license fee plus an annual software maintenance charge; the Limited Time Plan provides for a monthly combination license/maintenance fee for a term of five years.

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Burroughs CP 9400 and CP 9500 Series Communications Processors

		Monthly Charge* 1-Year Lease	5-Year Lease	Purchase Price	Monthly Maint.
	CP 9400 Series				
CP 9452	Basic System includes 2 MHz main processor with 96K-byte memory, cabinet, power supply, real-time clock, display/keyboard console, display control, integral 1MB diskette drive, 18.8MB fixed disk drive, Universal Disk Control, Disk Exchange, data communications processor with 8K-word memory and support for lines; 7-line base & expander set, 2 line adapters, and 2 direct-connect kits	$855	$714	$26,500	$243
CP 9471	Basic System includes 2 MHz main processor with 112K-byte memory, cabinet, power supply, real-time clock, display/keyboard console, display control, free-standing 1MB diskette drive, 18.8MB fixed disk drive, Universal Disk Control, Disk Exchange, data communications processor with 8K-word memory and support for 16 lines, 4-line base and expander set, 2 line adapters, and 2 direct-connect kits	1,145	947	35,500	325
CP 9472	Basic System includes 2 MHz main processor with 112K-byte memory, cabinet, power supply, real-time clock, display/keyboard console, display control, free-standing 1MB diskette drive, diskette control, 130.4MB dual disk pack drive with electronic controller, disk pack control, data communications processor with 8K-word memory and support for 16 lines, 4-line base and expander set, 2-line adapters, and a direct connect kit	1,435	1,187	44,500	408
	Memory Options				
CP 9410	8K-Byte Memory Module	13	10	400	6
CP 9411	24K-Byte Memory Module; for CP 9452 only	70	67	2,500	22.30
	Data Communications Options				
CP 9431-20	Line Base; handles up to 4 half-duplex lines; for CP 9471/9472 only	8	6	225	3.40
CP 9431-21	Line Base; handles up to 4 half and/or full duplex lines; for CP 9471/9472 only	12	10	365	6.90
CP 9431-24	Line Expander; handles up to 4 lines; for CP 9471/9472 only	8	6	225	1.80
CP 9431-1	Line Adapter; for attachment of RS-232-C TDI-, and BDI-compatible devices; for CP 9452 only	13	10	400	3
CP 9431-2	Line Adapter; for attachment of RS-232-C, TDI-, abd BDI-compatible devices; for CP 9471/9472 only	13	10	400	3
CP 9431-6	Line Adapter; for attachment of BDLC-compatible devices; requires 2 line adapter slots in the data communications processor	17	14	500	4.90
CP 9431-9	Connect Kit; for RS-232-C modem connections; includes 50-foot cable	2	2	62	—
CP 9431-10	Connect Kit; for RS-232-C modem connections; includes 25-foot cable	2	2	52	—
CP 9431-11	Connect Kit; for TDI or BDI direct connections	1	1	22	—
CP 9431-8	Dual-Line Auto-Call Unit Interface; permits automatic dialing of up to two lines via Bell 801A Automatic Calling Unit; includes one cable kit; for CP 9471/9472 only	13	10	375	3
CP 9431-13	Cable Kit; for second auto-call unit line	2	2	46	—
CP 9431-15	Second Data Communications Processor; includes 8K-word memory; supports up to 4 lines; for CP 9471/9472 only	116	94	3,475	30.50
CP 9431-16	Second Data Communications Processor; includes 8K-word memory; supports up to 16 lines; for CP 9471/9472 only	133	107	4,000	48.30
	Peripheral Attachment Options				
CP 9421-1	Operator Console Control; for attachment of B 9348-4 display/keyboard terminal	23	19	700	5.50
CP 9421-2	Operator Console Control; for attachment of B 9346-4 printer/keyboard terminal	23	19	680	5.30
CP 9422-1	Card Reader Control; for attachment of B 9115, B 9116, or B 9117 card reader	20	16	600	10.80
CP 9422-2	Card Punch Control; for attachment of B 9418-2 card reader/punch	23	19	700	5.50
CP 9423-1	Line Printer Control; for attachment of B 9249-1/-2/-3/-4 or B 9246-3/-6 line printer	17	13	500	7.70
CP 9423-2	Line Printer Control; supports ASCII data only; for attachment of B 9247-16 line printer	30	25	900	7.70
CP 9423-3	Line Printer Control; supports EBCDIC data only; for attachment of B 9247-16 line printer	30	25	900	7.70
CP 9425-1	Magnetic Tape Cassette Control; for attachment of B 9490-25 or 9497-11 tape cassette unit	27	22	800	6.30
CP 9425-2	Magnetic Tape Cassette Control; for attachment of B 9497-15 tape cassette unit	30	25	895	7
CP 9425-3	Magnetic Tape Drive Control; for attachment of B 9491-2 tape drive	43	35	1,288	14.40
CP 9425-4	Magnetic Tape Drive Control; for B 9491-4 tape drive attachment to CP 9452 only	77	62	2,295	18
CP 9425-5	Magnetic Tape Drive Control; for B 9491-4 tape drive attachment to CP 9471/9472 only; requires two I/O channel slots	77	62	2,295	18
CP 9426-1	Cartridge Disk Control; for attachment of up to four B 9480-12/-22 or B 9481-12 cartridge disk drives; requires CP 9426-11	23	27	980	12.20
CP 9426-11	Cartridge Disk Exchange; for attachment of up to four B 9480-12/-22 or B 9481-12 cartridge disk drives; requires CP 9426-1	17	14	495	5.80
CP 9426-2	Universal Disk Control; for attachment of up to four fixed disk, cartridge disk, and/or diskette devices; requires CP 9426-12	38	30	1,150	14.20
CP 9426-12	Universal Disk Exchange; for attachment of up to four fixed disk, cartridge disk, and/or diskette devices; requires CP 9426-2	17	14	495	5.27

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		Monthly Charge* 1-Year Lease	5-Year Lease	Purchase Price	Monthly Maint.
	Peripheral Attachment Options (Continued)				
CP 9426-3	Disk Pack Control; for B 9387-11/-12 disk pack attachment to CP 9452	61	49	1,820	14.20
CP 9426-4	Disk Pack Control; for B 9387-11/-12 disk pack attachment to CP 9471/9472	61	49	1,820	14.20
CP 9427-1	Diskette Control; for B 9489-11 diskette drive attachment to CP 9472 only	33	27	980	7.70
CP 9441-1	I/O Expansion Module; provides additional 4 I/O channels for peripheral attachment; for CP 9471/9472 only	67	54	2,000	15.70
	CP 9500 Series				
CP 9551	Basic System includes four 1MHZ processors providing an aggregate of 320K bytes of memory, cabinet, power supply, time-of-day clock, integral 6MB dual-drive diskette subsystem, diskette control, Disk Loader Module E, 2 Type 1 line adapters, 1 modem connect kit, and 1 direct connect kit	581	480	18,000	120
CP 9555	Basic system provides all features of CP 9551 plus 19.3MB fixed disk drive and fixed disk control	919	760	27,000	180
CP 9556	Basic system provides all features of CP 9551 plus 77.4MB fixed disk drive, fixed disk control, and additional 64K bytes of memory	1,048	867	31,000	207
CP 9558	Basic System includes four 2MHz processors providing an aggregate of 352K bytes of memory, cabinet, power supply, and real-time clock	415	332	12,435	69
CP 9572	Basic System includes five 2MHz processors providing an aggregate of 608K bytes of memory, cabinet, power supply, and real-time clock	816	653	24,484	76
	Memory Options				
CP 9510	64K-Byte Memory Module; for CP 9551/9555/9556 only	41	33	1,225	11
CP 9511-1	64K-Byte Memory Module; for CP 9558/9572 only	45	36	1,350	8
CP 9511-2	128K-Byte Memory Module; for CP 9558/9572 only	85	68	2,550	15
	Processor Add-ons and Options				
CP 9502	Processor; 2MHz; for CP 9558/9572 only	98	78	2,950	15
CP 9503-1	I/O Select Module; for CP 9572 systems with 1MB or cartridge Loader Disk only	82	66	2,450	12
CP 9503-2	I/O Select Module; for CP 9572 systems with 3MB or 6MB Loader Disk only	82	66	2,450	12
CP 9503-3	I/O Select Module; for CP 9572 systems with 1MB Loader and Disk Pack	82	66	2,450	11.40
CP 9503-5	Second DCP Kit	7	6	215	2
	Data Communications Options				
CP 9531-1	Line Adapter, Type 1; for attachment of RS-232-C- or TDI-compatible devices	25	20	750	5
CP 9532-1	Line Adapter Type 2; for attachment of RS-232-C- or TDI-compatible devices (BDLC or non-BDLC)	25	20	750	5
CP 9531-7	Line Adapter; for attachment of BDLC-compatible devices	33	26	995	5
CP 9531-5	Connect Kit; for RS-232-C modem connections; includes 50-foot cable	5	5	150	—
CP 9531-6	Connect Kit; for RS-232-C modem connection; includes 25-foot cable	4	4	125	—
CP 9531-11	Connect Kit; for TDI direct connections	2	2	50	—
CP 9531-13	Auto-Call Unit Interface; permits automatic dialing of a line via Bell 801 Automatic Calling Unit; 50-foot cable	7	6	200	—
CP 9531-14	Auto-Call Unit Interface; permits automatic dialing of a line via Bell 801 Automatic Calling Unit; 25-foot cable	5	4	140	—
	Peripheral Attachment Options				
CP 9521-1	Operator Console Control; for attachment of B 9348-4 display/keyboard terminal; for CP 9551/9555/9556 only	25	21	726	5.50
CP 9521-2	Operator Console Control; for attachment of B 9361-1 display/keyboard terminal; for CP 9558/9572 only	20	18	600	3
CP 9523-1	Line Printer Control; for attachment of B 9249-1/-2/-3/-4 or B 9246-3/-6 line printer; for CP 9551/9555/9556/9558 only	20	16	604	7.70
CP 9523-2	Line Printer Control; for attachment of B 9249-1/-2/-3/-4 or B 9246-3/-6 line printer; for CP 9572 only	20	16	604	4
CP 9529-1	Magnetic Tape Control, for attachment of B 9491-4 Magnetic tape drive	77	62	2,295	13.40
CP 9526-1	Fixed Disk Control; for attachment of B 9493-20/-40/-80 fixed disk drive	29	24	874	7.70
CP 9526-2	Fixed Disk Control; for attachment of B 9493-9/-18 fixed disk drive	29	24	874	7.70
CP 9527-1	Burroughs-compatible Super Mini Disk Control; for attachment of B 9489-1 diskette drive	29	24	874	7.70
CP 9527-2	Burroughs-compatible Super Mini Disk Control; for attachment of B 9489-21/-23 diskette drive	29	24	874	7.70
CP 9527-3	Industry-compatible Mini Disk Control; for attachment of B 9487-17 diskette drive	29	24	874	7.70

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Burroughs CP 9400 and CP 9500 Series Communications Processors

		Monthly Charge* 1-Year Lease	5-Year Lease	Purchase Price	Monthly Maint.
	Peripheral Attachment Options (Continued)				
CP 9528-1	Cartridge Disk Control; for attachment of B 9480-12/-22 or B 9481-12 cartridge disk drive	29	24	874	7.70
CP 9528-2	Disk Pack Control; for attachment of B 9387-11/-12 disk pack; for CP 9558/9572 only	37	30	1,100	6.50
CP 9543-1	Disk Loader Module; for disk subsystem Option A; for CP 9551/9555/9556 only	28	23	850	7.70
CP 9543-2	Disk Loader Module; for disk subsystem Option B; for CP 9551/9555/9556 only	28	23	850	7.70
CP 9543-3	Disk Loader Module; for disk subsystem Option C; for CP 9551/9555/9556 only	28	23	850	7.70
CP 9543-4	Disk Loader Module; for disk subsystem Option D; for CP 9551/9555/9556 only	28	23	850	7.70
CP 9543-5	Disk Loader Module; for disk subsystem Option E; for CP 9551/9555/9556 only	28	23	850	7.70
CP 9543-11	Disk Loader Module; for disk subsystem Option A; for CP 9558/9572 only	28	22	850	7.70
CP 9543-12	Disk Loader Module; for disk subsystem Option B; for CP 9558/9572 only	28	22	850	7.70
CP 9543-13	Disk Loader Module; for disk subsystem Option E; for CP 9558/9572 only	28	22	850	7.70
CP 9543-14	Disk Loader Module; for disk subsystem Option F; for CP 9558/9572 only	28	22	850	5.50
	Peripherals				
B 9348-4	TD 831 Display Terminal; for use as operator console	137	129	3,071	26
	MT 983 Display Terminal; for use as operator console for CP 9558/9572 only	151	143	3,015	**
B 9361-1	Display Terminal; for use as local operator console for CP 9558/9572 only	58	46	1,400	32
B 9346-4	Console printer and Keyboard; 60 cps; for CP 9400 series only	160	139	5,253	41.20
B 9115	Card Reader; 300 cpm; 80 column for CP 9400 Series only	215	191	7,808	**
B 9116	Card Reader; 600 cpm; 80-column for CP 9400 Series only	273	253	9,845	**
B 9117	Card Reader; 800 cpm; 80-column for CP 9400 Series only		Contact vendor		
B 9135-2	Card Reader/Sorter; 8-pocket; 900 dpm; for CP 9400 Series only	1,480	1,332	51,157	**
B 9135-3	Card Reader/Sorter; 12-pocket; 900 dpm; for CP 9400 Series only	1,925	1,729	62,859	**
B 9137-4	Card Reader/Sorter; MICR only; 8-pocket; 1000 dpm; for CP 9400 Series only		Contact vendor		
B 9418-2	Card Reader/Punch; 45 cpm; 80-column; may be used as punch only; for CP 9400 Series only	349	311	12,420	**
B 9246-3	Line Printer; 320 lpm; includes 12-channel format tape reader	380	325	11,500	**
B 9246-6	Line Printer; 650 lpm; includes 12-channel format tape reader	475	390	14,000	**
B 9247-16	Line printer; 750 lpm; includes 12-channel format tape reader; for CP 9400 Series only	922	817	28,840	**
B 9249-1	Line printer; 85 lpm		Contact vendor		
B 9249-2	Line Printer; 160 lpm	222	200	5,990	**
B 9249-3	Line Printer; 250 lpm	296	266	7,990	**
B 9249-4	Line printer; 350 lpm	407	366	10,990	**
B 9948-1	12-Channel Format Tape Reader Option; for B 9249-1/-2/-3/-4 line printer	33	30	618	**
B 9491-2	Magnetic Tape Drive; 9-track; NRZ; 10K bytes; for CP 9400 Series only	246	200	7,107	**
B 9491-4	Magnetic Tape Drive; 9-track; 1600 bpi PE; 40K bytes	465	395	12,600	**
B 9490-25	Magnetic Tape Cassette Unit; NRZ; for CP 9400 Series only	57	55	1,689	**
B 9497-11	Magnetic Tape Cassette Unit; NRZ; for CP 9400 Series only	63	56	1,689	**
B 9497-15	Magnetic Tape Cassette Unit; PE; for CP 9400 Series only	63	56	1,689	**
B 9480-12	Cartridge Disk Subsystem; 4.6MB; dual drives; 80 millisecond average access time		Contact vendor		
B 9480-22	Cartridge Disk Subsystem; 4.6MB; dual drives; 145 millisecond average access time	296	278	7,010	**
B 9481-12	Cartridge Disk Subsystem; 9.2MB; dual drives; 100 millisecond average access time	452	430	10,163	**
B 9493-20	Fixed Disk Drive; 19.3MB; single-spindle; for CP 9500 Series only	370	315	10,000	**
B 9493-40	Fixed Disk Drive; 38.7MB; single-spindle; for CP 9500 Series only	505	480	13,500	**
B 9493-80	Fixed Disk Drive; 77.4MB; single-spindle; for CP 9500 Series only	593	533	16,000	**
B 9493-9	Fixed Disk drive; 9.4MB; single-spindle	204	183	5,500	**
B 9493-18	Fixed Disk Drive; 18.8MB; single-spindle	352	317	9,500	**
B 9493-28	Fixed Disk drive; 28.8MB; dual-spindle; for CP 9400 Series only; counts as two I/O devices	500	450	13,510	**
B 9493-37	Fixed Disk Drive; 37.6MB; dual-spindle; for CP 9400 Series only; counts as two I/O devices	556	500	15,000	**
B 9387-11	Disk Pack; 65.2MB; dual-drive; includes electronic controller	968	825	35,020	**
B 9387-12	Disk Pack; 130.4MB; dual-drive; includes electronic controller	1,310	1,117	47,380	**
B 9484-51	Disk Pack Increment; 130.4MB; dual-drive; to be attached to B 9387-12; 3 max. per system	969	764	31,827	**
B 9489-1	Burroughs-compatible Super Mini Disk; 1MB; integral; single-drive	34	30	910	**
B 9489-11	Burroughs-compatible Super Mini Disk; 1MB; free-standing; single-drive; for CP 9400 Series only	93	83	2,500	**
B 9489-12	Burroughs-compatible Super Mini Disk; 2MB free-standing; dual-drive; for CP 9400 Series only	141	127	3,815	**
B 9489-21	Burroughs-compatible Super Mini Disk; 6MB; integral; dual-drive; for CP 9500 Series only	186	169	5,010	**
B 9489-23	Burroughs-compatible Super Mini Disk; 6MB; free-standing; dual-drive; for CP 9500 Series only	223	200	6,010	**
B 9487-17	Industry-compatible Mini Disk Drive; 243K bytes; free-standing; single-drive; for CP 9500 Series only	122	110	3,296	**

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Burroughs CP 9400 and CP 9500 Series Communications Processors

	Unlimited Time Plan		Limited Time Plan (5 Yrs.)
	Initial Charge	Annual License Fee	Monthly Charge
Software			
Computer Management Transaction Control System; includes Computer Management System (CMS) and Computer Management Distributed Information System (CMDIS)	$4,000	$760	$145
COBOL Compiler	1,825	347	65
RPG Compiler	1,375	261	49
GEMCOS—Basic	700	133	25
GEMCOS—TCL Compiler	750	143	27
GEMCOS—Formatting Module	500	95	18
GEMCOS—Complete System	1,800	342	64
CANDE	540	103	19
ODESY	540	103	19
SYCOM	750	143	27
Remote Supervisory Console; for CP 9500 only	300	57	11
Inquiry	750	143	27
Store-and-Forward Message Switch	20,600	3,914	736
DOMAIN; requires GEMCOS	1,620	275	68
On-Line Reporter; requires GEMCOS	2,160	367	90
Audit Entry Host Utilities; requires GEMCOS	490	59	21
Burroughs Standard RJE	550	105	20
IBM 360/20 HASP RJE	825	157	30
IBM 2780/3780 Look-Alike; requires TDS in CMDIS	825	157	30
IBM 3270 Protocol; requires TDS in CMDIS	825	157	30
Burroughs Network Services (BNA Interface); for CP 9500 Series only	3,900	741	139
IBM Systems Network Architecture (SNA) Interface; requires TDS in CMDIS	1,950	371	70
CCITT X.25-Compatible Public Packet Switching Network Interface; for Canadian DATAPAC System only	825	157	30

*Monthly Lease price includes maintenance.
**Contact vendor for peripheral maintenance contract charges.■

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