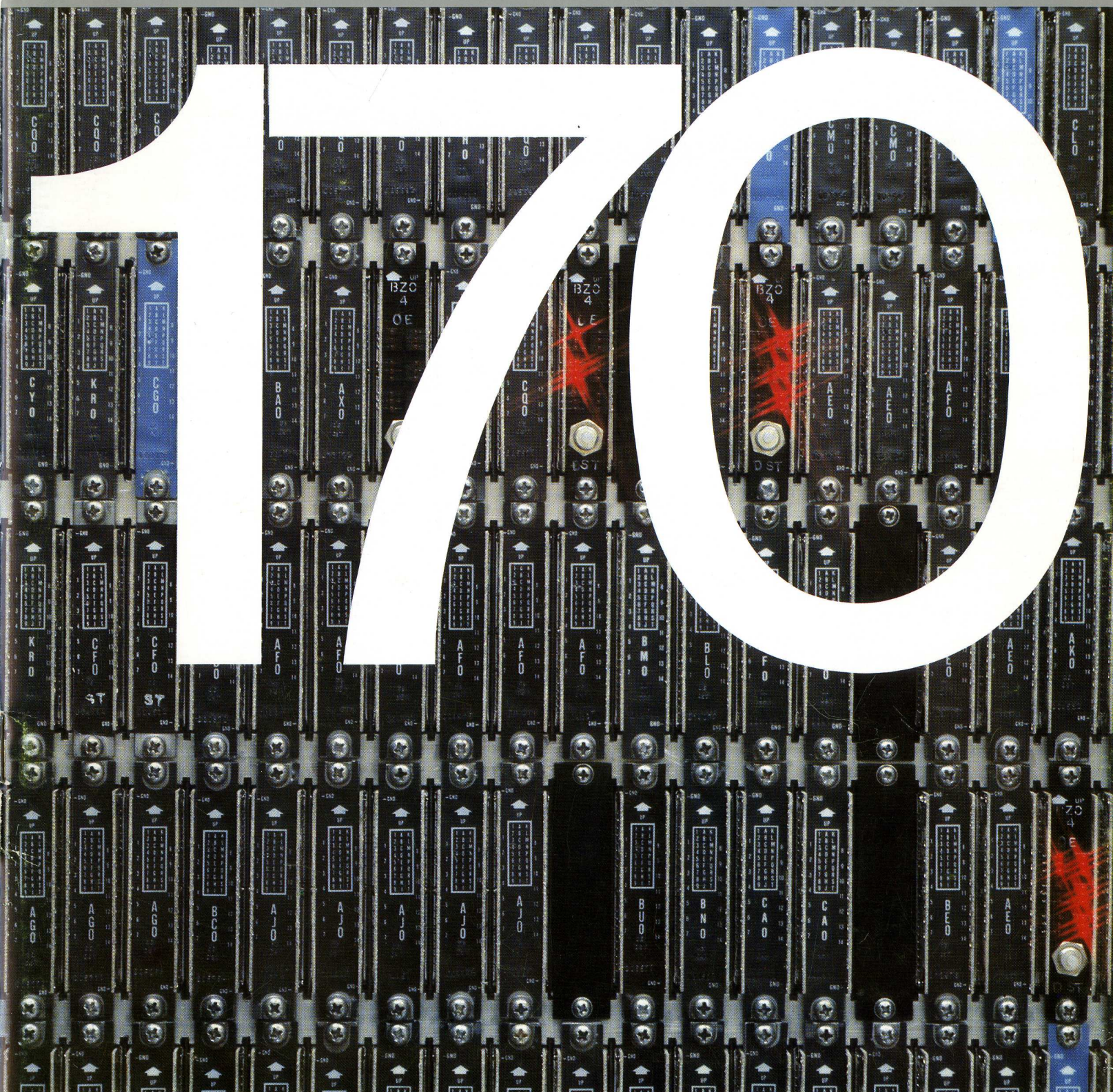
The Control Data CYBER 170 Series

CONTROL DATA

Compatible, Field Upgradeable,
High Performance Computer Systems.



The Control Data® CYBER 170 series is the newest in a distinguished family of computer systems.

In July 1963, Control Data announced the CDC® 6600, the first significant architectural change in computers since the birth of automatic math machines. The novel design concept separated computer functions into three distinct areas—computation, input/output and monitoring. Small peripheral processors within the system handle routine computing or communications jobs leaving the central processor free to concentrate on more complex calculations.

At that time the 6600 central processor was the most powerful in the world at five million operations per second. Computer power would advance to far greater speeds. But the distributive processing concepts established by the 6600 would permit Control Data computer systems to deliver price/performance benefits for years to come.

The CDC CYBER 70 series, manufactured in five models, was announced in 1970. This series extended these architectural features into the evolving markets of time-sharing and multimode operations.

The CDC CYBER 170 series, models 171 through 176, represents the newest in this family of computers. While incorporating refined versions of the architecture and software of its predecessors, CYBER 170 systems offer a broader range of performance levels, applications and cost effective operation.


NO SMOKING
FIRE-SMOKE DETECTION
SYSTEM IN OPERATION
CONTROL DATA
CYBER 170
CONTROL DATA
7
CONTROL DATA
8
CONTROL DATA
9
CONTROL DATA
CENTER
HORIZONTAL
VERTICAL
READ START
FOCUS
INTENSITY

The Control Data CYBER 170 Series

Control Data helps solve data processing problems through the application of advanced computer technology and a broad range of supporting services.

This brochure introduces the CDC CYBER 170 series/six distinct computer systems with compatible architecture designed to be field upgradeable and highly cost effective.

These versatile systems are serving data processing needs throughout business, industry, education and government. In the medium- to large-scale range, CDC CYBER 170 systems are performance engineered to process time-sharing, data base management, and local and remote batch applications.

If your computing needs are dynamic, the CDC CYBER 170 series can grow in increments to ensure that you can tailor the system to your needs.

Design features include effective operating systems, easy-to-use job control languages, efficient system commands and user interfaces, plus a wide range of compilers and application software.

System features include a broad range of peripherals, engineered with the quality and reliability that has established Control Data as the world's largest supplier of OEM peripheral devices.

The following pages briefly describe hardware and software elements of Control Data's CDC CYBER 170 computer family. Let us show you how system design and reliability engineering have joined to create an installed base of computer systems that are providing price performance leadership in meeting today's data processing challenges.

The CDC CYBER 170 model 173, pictured here, forms the hub of an instructional time-sharing network for California State University and Colleges (CSUC). Installed in Los Angeles, the computer assists students in coursework activities through an extensive library of application software maintained on the system. The model 173 supports 104 simultaneous users through communications links to terminals on all 19 campuses.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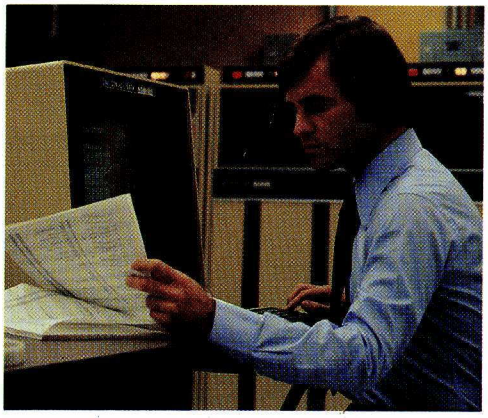
The Compatible CDC CYBER 170 Series



The CDC CYBER 170 series features six compatible computer systems in the mid- to large-scale range. All of these high-performance computers share the same basic architecture: this unique architecture distributes functions among a central processor for computation and auxiliary peripheral processors which perform system input/output and operating system functions.

For most of the CDC CYBER 170 models the central processor is field-upgradeable, and there is no software conversion throughout the entire line. The CDC CYBER 170 series uses the Network Operating System (NOS) throughout. The result is a cost-effective solution to your computing requirements.

The six distinctive CDC CYBER 170 models, 171, 172, 173, 174, 175 and 176, are built with common components and exhibit a high degree of commonality in their basic configuration, which is comprised of the central processor unit, the memory units and the peripheral processors.

If you start with a model 171 and find it necessary to increase your computer power, the CDC CYBER 170 series offers you a choice of cost-effective options. A second central processor can be added, or the basic mainframe can be upgraded to a model 172. If increased performance is required, the single-processor 172 can be expanded to a dual-processor configuration. Likewise, model 172 can be upgraded to a single-processor 173 and from there to a dual-processor 174. In any CDC CYBER 170 system configuration, additional memory units and peripheral equipment can be added to increase performance.

The flexibility of the CDC CYBER 170 series offers many advantages to its users. The six compatible models can collaborate with each other, with systems from other Control Data series, or with systems from other manufacturers in network configurations. In addition, the modularity and upgradeability of the CDC CYBER 170 product line offers a cost-effective growth plan that efficiently meets the business needs of today and provides for an excellent growth plan well into the future.

Software

The unique architecture of the CDC CYBER 170 series is supported by the Control Data Network Operating System which is available in two variants and provides a high level of multiprocessing and multiprogramming: Network Operating System (NOS) and Network Operating System for Batch Environment (NOS/BE).

These operating systems are designed to serve concurrently all users in a system or an entire network, regardless of the mode of operation (local or remote batch or time-sharing). This capability of supporting a remote terminal network and concurrently supporting batch processing makes the speed and computing power of the CDC CYBER 170 series available to a maximum number of users.

Input and output of all programs submitted to the computer, as well as allocation of resources, are monitored and controlled by the operating system in line with the distributed processing concept of the CDC CYBER 170 series. Many of the monitor functions are performed by the peripheral processors, which makes the central processor available for users' jobs.

NOS and NOS/BE have integrated schedulers which provide a coordinated approach to hardware/software resource allocation. The schedulers provide for the dynamic allocation of computer resources and central memory between conversational time-sharing, remote batch and local batch processing. As such, they provide for job-swapping, depending on resource requirements, availabilities and job priorities.

The Network Operating System represents the culmination of Control Data's extensive experience with large-scale systems and data networks and enables the CDC CYBER 170 series to excel in a broad variety of data processing tasks.

Central Processor

The CDC CYBER 170 models 171, 172, 173 and 174 feature a high-speed, unified arithmetic central processor unit which executes 18-bit and 60-bit operations and a Compare Move Unit (CMU) to enhance system performance when working with variable character strings.

The central processors for models 175 and 176 consist of arithmetic sections, subdivided into nine arithmetic function units, allowing concurrent execution of instructions.

The CPU is an integrated arithmetic and character-oriented processor which communicates with central memory. Since the central processor is isolated from the peripheral processor subsystem, computation is not hindered by input/output requirements. The central processor consists of a large and small arithmetic section, plus an instruction control section.

Model 171 is the base CPU for the CDC CYBER 170 family. An option of adding a second processor to increase the system's power/performance is available. A CMU option is available to enhance system performance when working with variable character strings. In the dual-processor configuration, each CPU contains an instruction control section which directs arithmetic operations and character manipulative functions.

Model 172 features an enhanced model 171 CPU. The model 172 provides greater computing power and increased performance capacity. The CMU is a standard feature for the model 172. The model 172 can be configured with either a single or dual CPU.

Model 173 uses the same basic CPU as models 171 and 172, but the performance level is further enhanced. The model 173 is available only as a single-CPU system. The CMU is a standard feature.

Model 174 employs two model 173 CPUs in a dual-processor configuration. The CMU is a standard feature within each processor.

Model 175 CPU features nine segments or functional units. These functional units operate as independent specialized arithmetic units which perform all the CPU's computations. The model 175 CPU includes an instruction stack which provides fast retrieval of previously executed instructions.

The model 176 CPU also features nine phased functional units which, along with an instruction stack, provide a high degree of internal parallelism. The phased concept of the function units permits concurrent execution of specific functions.

The range of capabilities and performance in comparison between models 171 and 176 is significant and, as has been pointed out, there is total compatibility among the six different processors. Moreover, the lower-performance models are ideally suited as front-end systems for the more powerful central processors.

Peripheral Processors

The peripheral processor subsystem consists of 10, 14, 17 or 20 functionally independent, programmable computers (peripheral processor units) each with 4096 12-bit words of MOS memory. These peripheral processors act as system-control computers and input/output processors.

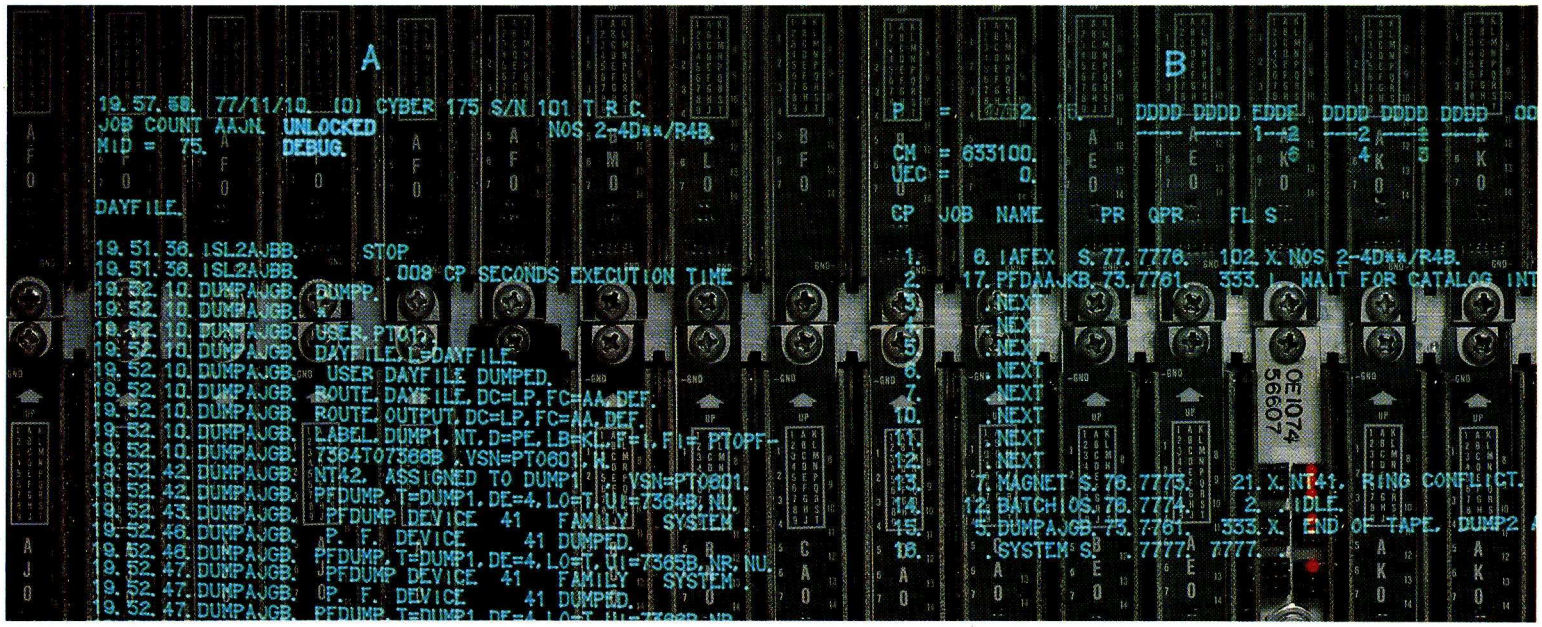
All peripheral processors communicate with central memory, external equipment and each other through 12 or 24 independent, bi-directional input/output channels. These channels transfer data into or out of the system in 12-bit words at a maximum rate of two words per microsecond.

Central Memory

To provide maximum flexibility and versatility, the CDC CYBER 170 series offers a selection of central memory options ranging from 65,536 words to 262,144 words. Central memory is organized into 8 or 16 logically independent, phased banks of 60-bit words. Each bank has a 400- or 275-nanosecond (major-cycle) cycle time, depending upon the CPU model. The minor-cycle transfer rate of the 60-bit word is either 50, 27.5 or 25 nanoseconds, depending upon the specific CPU models. However, because these banks are phased, central memory operates at much higher apparent rates than the basic cycle times suggest. Central memory control provides an orderly flow of data between memory and the requesting elements of the system.

Extended Memory

The central memory component of the CDC CYBER 170 series may be supplemented with additional extended memory. This extended memory option is available in increments ranging from 0.5 million to 2 million 60-bit words. The extended memory of the CDC CYBER 170 series may be used for system storage, data collection, job-swapping or user programs.



Peripheral Products

As a CDC CYBER 170 series user, you benefit from the experience and engineering advances Control Data has gained as the world's largest supplier of OEM peripheral equipment to other major mainframe manufacturers.

Control Data's high-performance printers, disk subsystems, magnetic tape transports, mass storage subsystems and card readers are not only designed with an eye on performance; they are designed and built with the user in mind. CDC CYBER 170 peripherals combine quiet operation, ease-of-use, reduced maintenance requirements, high-quality components, extended operational lifetimes and cost-effective performance.

Control Data disk subsystems provide sophisticated technology and superior workmanship that assures quality and the ability to meet your requirements.

We offer a complete line of tape transports built to exacting standards. Extensive use of integrated circuits and plug-in printed circuit boards provides outstanding performance and reliability.

Control Data's magnetic media products offer a complete line of disk packs, data modules and magnetic tapes tested to tighter specifications than industry standard.

Clear, legible print quality, operator-changeable cartridges, power stackers, acoustically dampened cabinets and easy operating controls are among the many features found in Control Data's complete line from matrix to fastrain printers.

The high quality and high performance levels of these peripheral devices, which are so essential to the success of any system operation, are possible only because peripherals are an integral part of Control Data's performance-engineered product line.

Applications

Because of its unique architectural design and broad array of applications software, the CDC CYBER 170 series finds widespread use in scientific and commercial data processing.

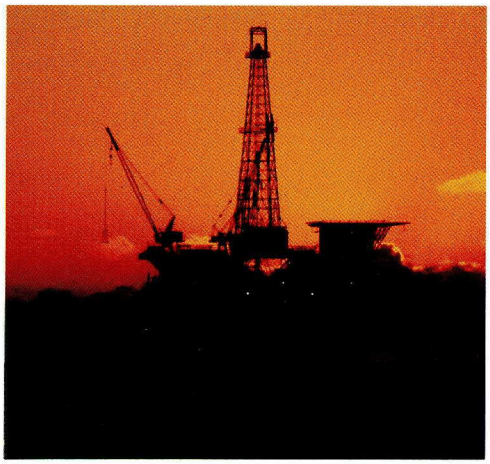
CDC CYBER 170 systems are currently utilized in large-scale energy management. These systems are providing constant, comprehensive assistance in monitoring vast electrical power networks.

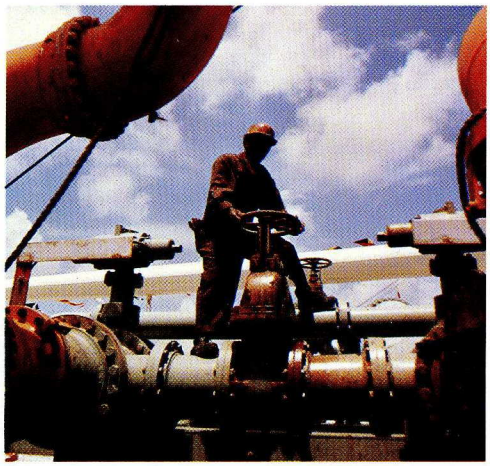
Educational institutions and agencies are faced with the problem of providing maximum access to computers with compatible expansion for future growth. Control Data offers the ideal solution with its CDC CYBER 170 computer systems. Many of these systems are currently providing reliable data processing capabilities for research, problem solving, computer science training, administrative data processing and library information systems. Increasingly, educational institutions are also turning to CONTROL DATA® PLATO®, a highly advanced computer-based education (CBE) approach which utilizes the CDC CYBER 170 series.

Because of its unique architectural design, the CDC CYBER 170 series is a valuable tool in the fields of nuclear physics, seismic processing in oil and mineral exploration, weather, astronomy and engineering. The CDC CYBER 170 series combines the storage capacity and the internal speeds to meet these requirements.

The CDC CYBER 170 series provides a powerful tool for the construction industry. Control Data offers versatile hardware and extensive software capability to handle the many problems in a construction project, ranging from the development of the initial bid to the completion of the finished job.

The CDC CYBER 170 series computer system can be applied in processing financial data for such institutions as home mortgage groups. The exceptionally large processing capability and growth potential of this system minimizes service interruptions.





CDC CYBER 170 banking systems are designed to process bank transactions as they occur, to update all pertinent records and to provide up-to-the-minute information for outlying branches as well as bank headquarters. Reliability and data integrity are outstanding features of this system.

CDC CYBER 170 systems are uniquely designed for data communication network applications. These network systems will provide the means to satisfy future data processing service requirements.

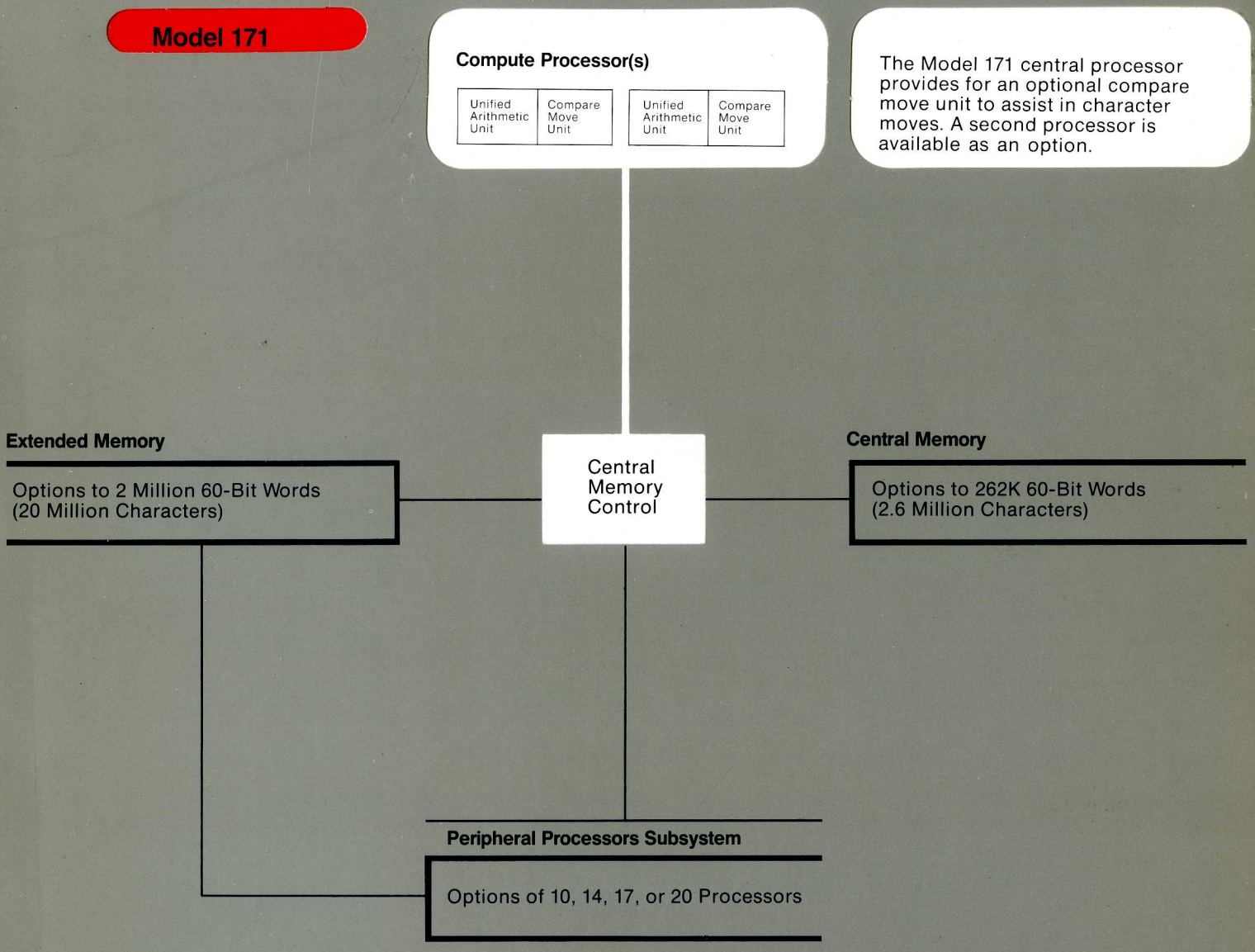
Many service centers are concluding that their own business strategy must consider this problem of functional convenience. Nearly every solution to this problem involves providing more integrated services and/or more comprehensive services.

Heavy demands are placed on the computing system which must implement a strategy of many comprehensive and integrated services provided through remote communications terminals. The large-scale CDC CYBER 170 systems are designed to meet those heavy demands.

Hybrid/simulation systems are most widely used for the study of such physical systems as aircraft, automobiles, oil refineries and living organisms. CDC CYBER 170 series has the capacity and the reliability to support and perform this type of computation and distribution of information, mixing engineering as well as business data processing.

The Control Data CYBER 170 Series

Model 171



Model 171

Compute Processor(s)

The Model 171 central processor provides for an optional compare move unit to assist in character moves. A second processor is available as an option.

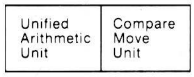
Model 172

Compute Processor(s)

The model 172 central processor includes the compare move unit as a standard function. A second processor is available as an option.

Model 173

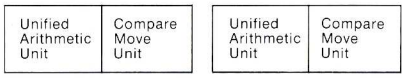
Compute Processor



The model 173 features the most powerful unified central processor available with the CYBER 170 family.

Model 174

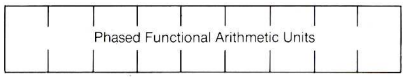
Compute Processors



The model 174 features two central processors.

Model 175

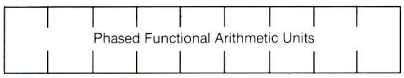
Compute Processor



The model 175 central processor features multi-function units. Each function unit is designed to perform one explicit function. These units can process multi-functions concurrently.

Model 176

Compute Processor



The model 176 is the most powerful system available in the CYBER 170 family.

STOP

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CORPORATE HEADQUARTERS
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